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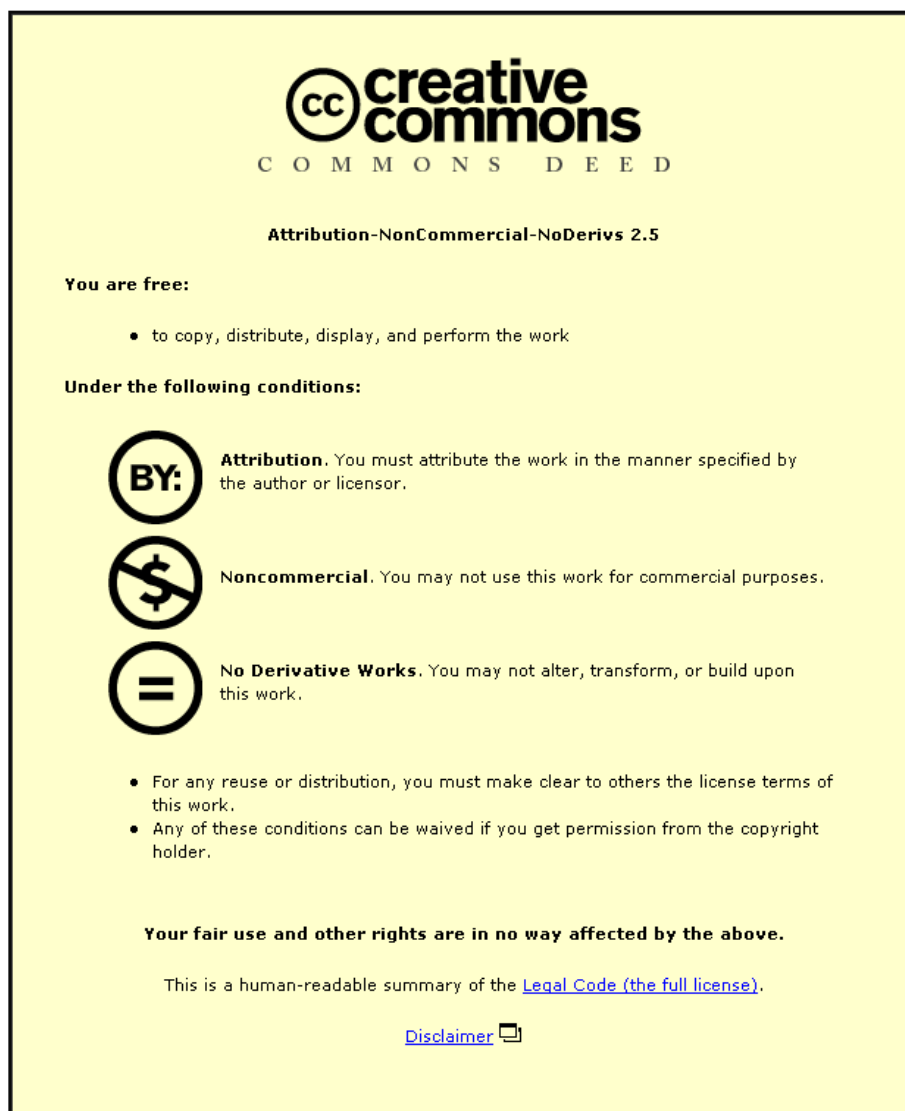
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**Assessing the Capacity of Small Independent Providers to Deliver
Improved Sanitation at Scale in Low Income Urban Settlements**

by


AMAKA OBIKA GODFREY, B.SC. (Hons), MSc

A Doctoral Thesis

**Submitted in partial fulfilment of the requirements for the award of Doctor of
Philosophy of Loughborough University**

July 2009

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Acknowledgement

Getting to this stage has been a long and winding process, which I would never have accomplished without the support of many people. I will start by thanking my husband, Sam without whose persistent push I will still be discussing the scope of my research; thank you husband, I have finally 'got on with it'. I will like to thank a good friend and colleague, Mimi Jenkins for our discussions at the onset that helped shape my research idea. My immense gratitude goes to Meki for all her assistance during the translation of the research tools and results, and to WaterAid Tanzania for their great support. This work would not have been possible without the KaR research on social marketing of sanitation funded by the Department of International Development (DFID), which helped define the hypothesis for this research. My sincere appreciation goes to my supervisor, Dr Andrew Cotton who believed in me and helped me to narrow down my wide thoughts into a cohesive and manageable research. I also wish than my friends and colleagues at WEDC for all their support, Frank, Sam, Trisha and Glenda; and our two dogs, Blue and Bella that sat by me all day and night towards the end.

Finally, I can now comfortably wear my high heels through the corridors of WEDC without the fear that Prof. Sohail will ask when I am handing in my PhD. Thank very much Sohail for keeping up the pressure.

I dedicate this thesis to my dad who did not live to see me get a PhD in sanitation, which he always said was the 'foundation for development'.

Abstract

More than half of the human population will be living in urban areas in 2008, of which 81 percent will be in poor areas of towns and cities of the developing world. Governments of most African cities are unable to provide the urgently needed sanitation facilities amongst other services. The informal sector (small independent providers) rather than externally supported efforts provide the majority of household sanitation facilities. The commonly held assumption amongst sector professionals is that partnership with the informal private sector to develop the sanitation market is a sustainable way of increasing access to improved sanitation in low-income urban areas. This research assesses the capacity of small independent providers of sanitation services (SIPS) to up scale and accelerate the delivery of improved sanitation. The thesis adds to an improved understanding of the capacity of small independent sanitation providers to upscale the delivery of improved sanitation and answers the following questions: what is their level of knowledge, skills and experiences of various sanitation options?; what are house owners' preferences?; and what are their experiences of obtaining sanitation services from small independent providers?. The research adopted a mix of qualitative and quantitative research methodologies in order to ensure the validity and reliability of the findings. The field work was conducted in the three municipalities in the city of Dar es Salaam, Tanzania. The thesis concludes that small independent providers have the potential to upscale the delivery of improved sanitation facilities but not without capacity building, particularly in the areas of developing appropriate sanitation technologies; appropriate enabling environment (infrastructure to support hygienic emptying and sludge disposal, and effective policy and regulatory framework) and support with demand generation. The implications of the research highlight the need to integrate any SIPS capacity enhancement and 'official' involvement in sanitation provision as part of an urban improvement programme. The recommendations from the thesis outline key support areas for the respective SIPS typologies, and the responsibilities of the various stakeholders (government, NGOs, donors) and SIPS. Potential areas of further research include development of appropriate sanitation technology for low-income urban settlements and creating an effective enabling environment.

Key words: Sanitation, low-income, peri-urban, informal sector, small independent providers, capacity development, latrines, pit emptying sub-Saharan Africa, Tanzania

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Glossary of terms

Accelerate	Increasing the speed of delivering improved sanitation.
Capacity	The ability of individuals to perform their functions effectively and efficiently in a sustainable manner
Chi-square	It is a measure of observed frequencies of cases against expected frequencies in a variable which has more than two categories
Cramers V	It provides a measure of the strength of the relationship between two variables from a contingency table.
Debes	10 litre tins use for measuring and selling gravel for construction.
Demand	Customers desire for goods or services
Drum latrine	Pit latrine lined with metal drums
EEPCO	Environmental Engineering and Pollution Control Organisation
Frogmen	Pit emptiers
Fundis	Artisans (Latrine builders)
Improved sanitation	Hygienic management of human excreta from storage, transportation, treatment and disposal. At the household level, it is the ownership and use of latrines that prevents contact between humans and excreta
Independent	Individual sanitation providers that are not controlled by another person or the government
Landladies	Female owners of houses
Landlords	Male owners of houses
Latrines	Basic facilities used at household level to store human excreta such as the pit latrines.
Marketing	Promotion and selling of a product or service at specified prizes
Sink	White ceramic squat pans
SIPS	Small independent providers of sanitation services
Toilets	Morden water-based facilities used at household and institutional levels to store human excreta such as the water closet (WC).
VETA	Vocational Education and Training Centre
WEPMO	Water and Environmental Protection and Management Organisation

List of acronyms

DFID	Department for International Development
EEPCO	Engineering, Environmental and Pollution Control Organisation
FGD	Focus Group Discussion
MDG	Millennium Development Goal
NGOs	Non Governmental Organisations
PHAST	Participatory Hygiene and Sanitation Transformation
SIPS	Small Independent Providers of Sanitation
TZS	Tanzania Shillings
UK	United Kingdom
UNFPA	United Nations Population Agency
UNICEF	United Nations Children's Fund
VETA	Vocational and Technical Training Agency
VIP	Ventilated Improved Latrine
WATSAN	Water and Sanitation
WC	Water Closet toilet
WEDC	Water, Engineering and Development Centre
WELL	Water and Environmental Health at London and Loughborough
WEPMO	Water and Environmental Protection and Monitoring Organisation
WHO	World Health Organisation
WSP	Water and Sanitation Programme

Chapter 1: Introduction

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Chapter 1: Introduction

1.1 General background

Providing water supply and sanitation services in urban areas of the developing world has become an even greater concern since the predicted acceleration of the urban population began. In 2008, the world is said to have more than half its population (3.3 billion people) living in the urban areas and this figure is expected to rise to 5 billion by 2030 (UNFPA 2007). The majority of the new urban migrants will be poor and will settle in the low-income areas. The developing countries, especially Africa and Asia, are expected to have their urban population more than double between 2000 and 2030. Africa's annual population growth of 2.9% per annum puts it as the fastest growing region of the world (UNFPA 1994). Africa is also the fastest urbanising continent with the total urban population expected to rise from 300 million in 1990 to 700 million in 2025, and by 2020 over 50% of the population of Africa will be living in the urban areas (Water Utility Partnership 2003).

Africa has almost the lowest sanitation coverage of any region in the world, second only to Asia. However, it is predicted that the sanitation crisis will be worse in Africa due to its growing urban population. Despite the efforts made during the water and sanitation decade, WHO and UNICEF in their report in 2000 indicated that over 46 million people in urban areas of Africa did not have access to sanitation in 2000 (WHO and UNICEF, 2000). This figure can be said to be conservative considering the actual situation in many urban areas in Africa. It is estimated that 211 million people will need to be provided with access to improved sanitation in urban areas in Africa to meet the international target by 2015. The majority of the population without access to sanitation are located in low-income urban settlements.

1.2 Global overview of water and sanitation

'The combination of safe drinking water and hygienic sanitation facilities is a necessity for improved health and for the fight against poverty, child death, and gender inequality' (UNICEF and WHO 2004). Several studies have shown that improved sanitation leads to improved health and nutrition, particularly among children (Esrey, Gough et al. 1998). Yet half the population (2.5 billion) of the developing world lack access to 'improved sanitation', which includes 1.2 billion without facilities at all (UNICEF and WHO 2008). 'Improved sanitation' has been defined by UNICEF and WHO (2008) as 'facilities that ensure hygienic separation of human excreta from human contact'. These facilities include flush or pour-flush latrines (to piped sewer system; septic tank; pit latrine), ventilated improved pit (VIP) latrines, pit latrines with slab and composting latrines.

The UNICEF and WHO report indicates a decline in open defecation from 24% worldwide in 1990 to 18% in 2006 (UNICEF and WHO 2008). However, 48% of the population in Southern Asia and 28% in sub-Saharan Africa still practise open defecation. Although open defecation has been declining worldwide, the proportion of people without improved sanitation decreased by only 8% between 1990 and 2006. If this trend continues, and without accelerated action, the world will not achieve half of the Millennium Development Goal (MDG) target for sanitation by 2015. Improved drinking water and sanitation contributes to the eight MDG goals, which are to; *eradicate extreme poverty and hunger; achieve universal primary education; promote gender equality and empower women; improve maternal health; combat HIV/AIDS, malaria and other diseases; sustainability; and develop a global partnership for development*. With barely 6 years left to meet the target, 173 million people on average need to have access to improved sanitation facilities annually. Unfortunately, most countries that are not on track to meet the MDG target are in sub-Saharan Africa and in Southern Asia.

There are also urban – rural disparities in sanitation coverage judging by the fact that 7 out of 10 people without improved sanitation live in the rural areas. However, rapid urban population growth is posing an increasing challenge. Although the number of people living in urban dwellings using improved

sanitation has risen by 779 million since 1990, it has not kept up with urban population growth of 956 million.

It was estimated that in 2004, about 5.3 billion (83%) people worldwide used water from improved sources (WHO and UNICEF 2006). The WHO and UNICEF Joint Monitoring Programme for water supply and sanitation describes improved drinking water sources as piped water into dwelling, plot or yard; public tap/standpipe; tubewell/borehole; protected dug well; protected spring; and rainwater collection. It is estimated that additional drinking water infrastructure to serve 1.1 billion is required if the MDG target is to be met in 2015. In addition to the provision of infrastructure, there is an urgent need to prevent current and future facilities from going into disrepair due to inadequate institutional arrangements, poor operation and maintenance, and poor cost recovery amongst others. Although the world is on track to achieve the MDG drinking water target, some regions including sub-Saharan Africa will not. This is as a result of the 85% increase in urban population from 1990 – 2004 thereby doubling the number of people without safe drinking water. Due to slow progress, slow coverage and the huge gap between urban and rural coverage, sub-Saharan Africa is unlikely to reach the MDG target.

1.3 Urban sanitation in Africa

Various studies have confirmed the significant benefit of sanitation on public health (Dillingham and Guerrant 2004; Esrey, et al 1991). Despite the gains made in increasing sanitation coverage during the water and sanitation decade, a large proportion of Africans still lack adequate sanitation facilities. Sanitation coverage is defined as the proportion of people that own and used facilities that facilitate hygienic management of human excreta. It is estimated that at least 437 million (64%) Africans do not have access to improved sanitation, an increase of 75 million since 1990, the end of the water and sanitation decade (WHO and UNICEF 2004). A midterm assessment of progress towards meeting the MDG drinking water and sanitation target warns that 'without a sharp acceleration in the rate of progress, the world will miss the sanitation target by half a billion people'. Sub-Saharan Africa and South Asia are the regions that are most unlikely to meet the target at the current rate of progress. The WHO

and UNICEF 2008 report indicates that 26 out of the 34 countries with low improved sanitation coverage of less than 33% are in sub-Saharan Africa.

In urban areas of sub-Saharan African countries, one in three persons uses a shared sanitation facility. This is often as a result of the limited sanitation options available in many densely populated cities and towns, a problem that is likely to increase if the urban and peri-urban population continues to grow at the current rates. The use of improved sanitation is substantially lower among the poor than the rich. The impacts and risks of a lack of sanitation are more acute in urban poor communities as these tend to be much more densely populated and there is less space to dispose of excreta and wastewater (UNICEF 2000). The combination of rapidly increasing population growth and accelerating urbanisation together with low levels of water supply and sanitation coverage puts Africa at the greatest risk. With the current rate of urbanisation and widespread poverty in Africa, governments of most cities are unable to provide the urgently needed sanitation facilities amongst other services.

The reasons for the poor access to improved sanitation in low-income urban communities include inappropriate approaches, neglect of consumer preferences, ineffective promotion and low public awareness, (Simpson-Hébert and Wood 1998). In a similar report by LaFond (1995), she emphasised that investment in sanitation has been inadequate due to low demand and the time taken to stimulate demand. Furthermore, key decision-makers are not clear about an overall strategy for sanitation programming and differ on the optimal role for governments, NGOs, private sector, users and external donors in programme implementation.

1.4 Small independent providers of sanitation services

Whilst most settlements of the developed world are connected to a waterborne sewer network, only a few households enjoy this privilege in sub-Saharan Africa. These houses are often located in the planned higher income areas. Unfortunately the majority of the new urban migrants live in poor informal settlements where sanitation facilities are public, shared or individual

household. These on-plot facilities range from various pit latrine options to pour-flush latrines and are paid for by the house owners and provided by a small independent private sector. The small private sector, often referred to as the informal sector, plays a major role in delivering sanitation services to households in urban and peri-urban areas of sub-Saharan Africa. This important role is increasingly being recognised by sector practitioners although not as much as the private sector providers of water supply. This is mainly because the sanitation providers are informal small individual providers (often bricklayers or masons) who do other manual jobs on the side. The big question is, if the sector is moving more towards private sector participation in the delivery of water and sanitation services, is the sanitation business profitable enough to attract a more formal private sector as in water supply, and do these small independent providers have the required capacity to respond to the sanitation crisis in low-income urban communities in sub-Saharan Africa?

1.5 Purpose of the research

This research is intended to facilitate planning process for government, non-government and international organisations and those planning for scaling up and accelerating access to improved sanitation in urban areas. The research seeks to assess the capacity of small independent providers to upscale the delivery of improved sanitation in low-income urban communities in response to household preferences and demands. These providers have been referred to throughout this thesis as small independent providers of sanitation (SIPS).

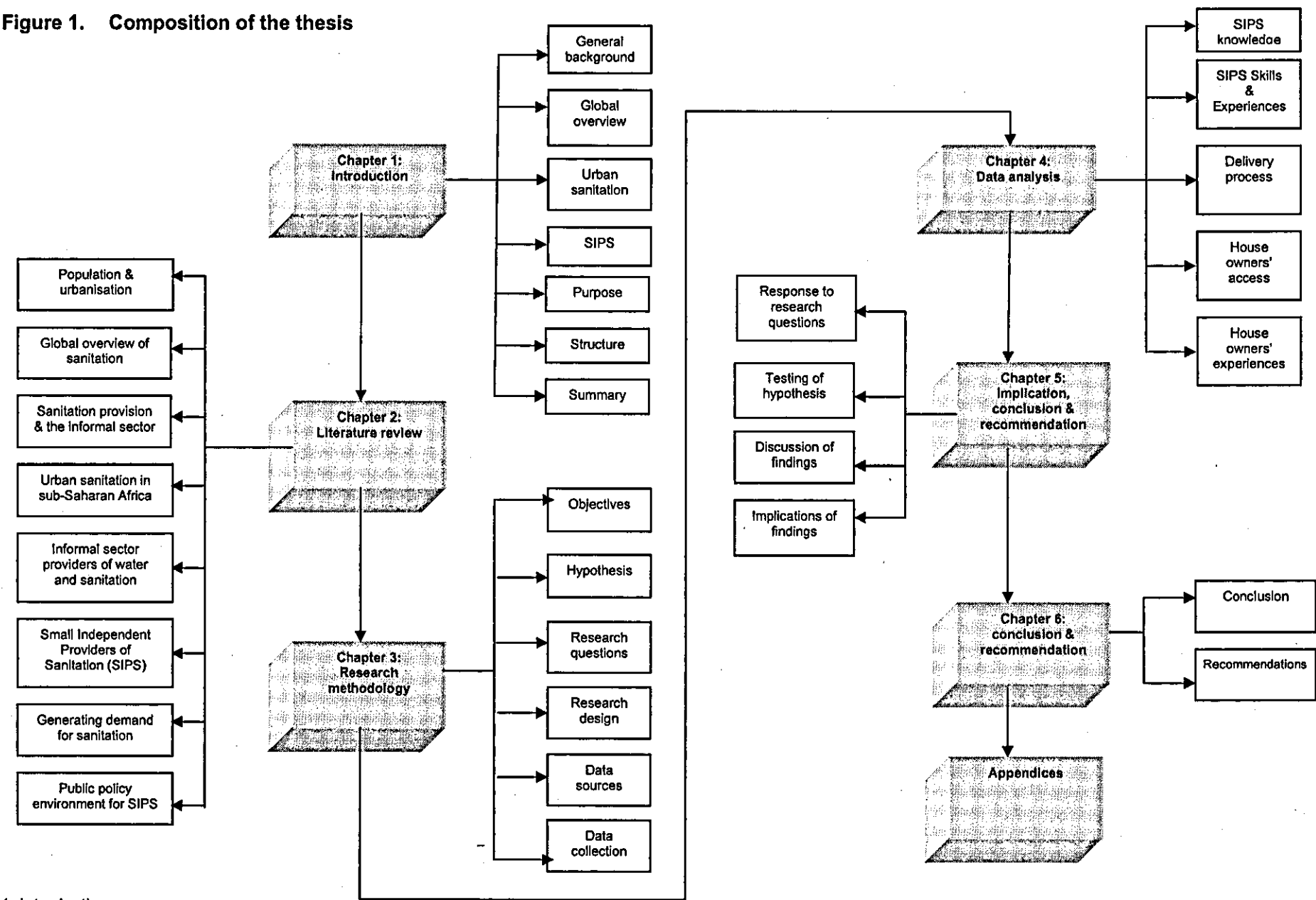
In order to develop a comprehensive understanding of the role of SIPS in the provision of sanitation in low-income urban settlements, the study included house owners and tenants, and covers technical, financial and socio-cultural issues. An in-depth analysis of the process of acquiring a household latrine and the relationship between SIPS and house owners was conducted. The aim was to throw more light on the otherwise complicated process of acquiring a latrine facility in low-income urban settlements. The study also paid attention to the knowledge and awareness, skills, and experiences of SIPS in relation to sanitation facilities. It defined the typology of SIPS and outlines the enabling

environment issues to maximise the ability of SIPS to upscale and accelerate the delivery of improved sanitation in low-income urban settlements.

1.6 Composition of the thesis

The thesis has been structured to provide a logical order to the study, findings, conclusion and recommendations. It begins with **Chapter 1**, which is a general introduction to the context, and the purpose of the research. **Chapter 2** contains the review of published and grey literature on urbanisation and urban sanitation in Africa, private sector role in sanitation provision, generating demand for sanitation and the enabling environment for sanitation delivery. **Chapter 3** describes the research design including objectives and the hypothesis on which the research is based. It also highlights the data collection methodology and the sources of data. Qualitative data analysis encompassing SIPS and house owners, and quantitative analysis of the household surveys are presented in **Chapter 4**. Discussion and implications of findings, are presented in **Chapter 5**. Chapter 6 is the research conclusions and recommendations. Each chapter starts with an outline of the contents and ends with a summary of key points. A schematic summary of the structure to the thesis is shown in the next page.

Figure 1. Composition of the thesis



1.7 Summary

The majority of the people that do not have access to sanitation are primarily located in low-income communities in urban areas. Although the figure is much lower than the numbers of unserved population in the rural areas, the global assessment report noted that urban services in Africa and Asia will face great challenges over the coming decades to meet the fast-growing needs due to the projected urban population growth. The combination of fast-growing population with accelerated urbanisation and low levels of water supply and sanitation in Africa increases its vulnerability to the risk of water and sanitation-related diseases. To achieve the target of halving the proportion of people without access to improved sanitation 2015, there is an urgent need to investigate a sustainable mechanism for delivering sanitation services to the urban poor and accelerating access to improved sanitation. The majority of the sanitation facilities in low-income urban settlements are paid for by the house owners and provided by the small independent private sector. These providers operate informally often with no technical training and limited knowledge of appropriate low-cost options. The focus of this research is therefore to assess the capacity of small independent providers to respond to household demand and preferences for sanitation, and their potential role in accelerating access to improved sanitation.

More recently, sector practitioners are beginning to stress that small independent providers can play a major role in upscaling access to improved sanitation in low-income urban settlements. However, unless we develop and conduct an in-depth assessment of the capacity of these informal sector providers, it will be an over assumption to expect them to deliver improved sanitation at a scale necessary to accelerate coverage amongst the urban poor population.

The research will improve our understanding of the level of knowledge and awareness of appropriate low-cost latrine options amongst the SIPS, their skills and experiences, and the process for acquiring household sanitation. The research will also throw more light on house owners' motivations, constraints and preferences for latrines.

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Chapter 2: Literature review

2.1 Chapter Outline

This chapter reviews published and grey literature related to the delivery of improved sanitation with emphasis on low-income urban communities. The chapter is made up of thirteen subsections including the outline. The documents reviewed and definition of key terminologies are shown in sections 2.2 to 2.4. The literature review is organised around five key sections as shown in section 2.2. It begins with a review of population growth and urbanisation in Africa in section 2.4; global overview of sanitation in 2.5 and urban sanitation in sub-Saharan Africa in 2.6. Sections 2.7 and 2.8 review the informal sector providers of water supply and small independent providers of sanitation respectively. Issues related to generating demand for sanitation, and enabling environment for SIPS are reviewed in sections 2.9 and 2.10 respectively. Information gaps in the literature are outlined in section 2.11 and the chapter ends with a summary that gives an overview of key issues relating to small independent providers of sanitation services in low-income urban settlements.

2.2 Documents reviewed

The literature review covers a wide range of issues related to sanitation in low-income urban areas. It draws on published and grey literature from over 150 relevant documents, which has been summarised in various sections as follows: population growth and urbanisation in Africa; overview of sanitation access and coverage levels; urban sanitation provision in sub-Saharan Africa; informal sector providers of sanitation services, including their capacity to respond to demand; and the existing policy framework for their services. Informal sector (small independent providers) participation in the delivery of water and sanitation in urban areas was critically reviewed to identify potential areas for capacity building. Other factors, including demand and enabling environment issues that are likely to impact on the ability of small independent providers of sanitation services (SIPS), were also noted.

2.3 Brief notes on terminology

Sanitation in this thesis is defined as the safe collection, storage and treatment, and disposal of human excreta and does not include the wider environmental sanitation such as solid waste management. Two issues that are prominent in the review and formed the basis for the thesis are small independent providers of sanitation (SIPS) and low-income urban settlements. These are individual masons and labourers that work independently in the provision of household sanitation services. This section explains the two terminologies and the extent to which they are covered in the review. The general assumption particularly in the developing countries is that the government, often referred to as the '*public sector*', has the responsibility to provide water supply and sanitation services to the people. In reality these services, particularly in low-income urban settlements, are provided by private companies, individuals or groups paid for by households. This group, referred to as non-state providers or the private sector, includes all providers existing outside the public sector that operate on a profit or not-for profit basis (Moran and Batley, 2004).

The private sector or non-state providers can further be divided into three broad categories, formal private operators including large international conglomerates, informal private providers, and civil society/NGO groups (Sansom, 2006). The focus of the research is on small independent providers of sanitation (SIPS) who are part of the informal sector. The informal sector is defined as a 'segment of the economy comprising small-scale producers and distributors of goods and services, and consisting largely of independent, self employed producers' (Water Utility Partnership, 2003). Some of the characteristics of the informal sector include very little operational capital, use of low level of technology and skills, provision of low incomes and unstable employment and reliance on local resources. They are generally unregistered and are not supported or regulated by the government (Eduardo Mundlane University, 2006, International Labour Organisation, 1998, Water Utility Partnership, 2003).

In order to have an in-depth understanding of the operations of SIPS, the review also looked at small-scale providers of other services, particularly water supply, that are well developed and researched. SIPS are described as individuals that are not linked to a larger group or utility but provide sanitation services directly to the house owner based on agreed conditions (Kariuki and Schwartz, 2005).

Several classification methods are applied to the private sector provider of water supply (see section 2.7.3) but none of the literature reviewed so far has provided a comprehensive classification of the small independent providers of sanitation services. SIPS can be classified into five broad categories depending on the type of service that they provide. They include *latrine builders*, *public facility managers*, *sewage removers*, *sludge treatment and disposal service providers* and *suppliers of latrine components*. Typologies of SIPS are discussed in detail in section 2.8.1 An understanding of the 'capacity' of SIPS to deliver improved sanitation at scale is important for planning for future urban sanitation improvements. 'Capacity is defined as the ability of independents and organisations to perform their tasks effectively and efficiently in a sustainable manner' (Hopkins, 1994, Horton et al., 2003).

Low-income urban settlements are locations at the periphery of large urban centres. According to Mara (2005) such settlements should be referred to as "peri-urban" areas. As a result of the urbanisation and declining economic performance, a great number of urban residents are housed in these settlements, which are informal, not planned, often unserved and sometimes illegal (Water Utility Partnership, 2003). The majority of the residents of the informal peri-urban settlements fall within the low-income group hence the use of the term 'low-income urban settlement' in this thesis. The most common characteristic of low-income urban settlements is poor geographical location, which often creates physical challenges to infrastructure and service provision by utilities. Moreover the residents are often considered "illegal customers" and thus are unable to demand for a service from utilities, hence the dependence on the informal sector service providers. They are poorly organised and lack access to formal institutions that can give them a voice or speak on their behalf.

2.4 Population growth and urbanisation in Africa

This section reviews the relationship between population growth, and the likely impact of the rapid urbanisation in Africa on the provision of infrastructure including water supply and sanitation services.

The world population at the beginning of the 20th century was 1.5 billion; by 1960 it had doubled and by late 1998 it went up to 6 billion. Annual additions to the global population rose from 47 million per year in 1950 - 1955 to a peak of 86 million in 1985 – 1990 mainly as a result of declining mortality rather than increases in fertility (UNFPA, 1999). The United Nations projections indicate a world population of 8.5 billion by the year 2025 and 10 billion by 2050 (United Nations, 2001). Africa's annual population growth of 2.9% per annum (UNFPA, 1994) puts it as the fastest growing region of the world. Africa's share of the global population is projected to rise to 20% in 2050 from only 9% in 1960 (UNFPA, 1999).

The movement of people towards cities has accelerated in the past 40 years, especially in the less-developed regions of the world. The percentage of the global population residing in urban areas has increased from one third in 1960 to 47% (2.8 billion people) in 1999. The world's urban population is now growing by 60 million per annum, about three times the increase in the rural population, and much of this is in the developing countries especially Africa and Asia, (UNFPA, 1999).

Urban areas are often defined by population figures and based on this various definitions have been given. In a report prepared by ISTD (1998), an urban area was defined as a centre with more than 5,000 inhabitants. This definition is quite different from the earlier one given by Hardoy and Satterthwaite (1995), which states that the simplest way to define small, intermediate and large urban centres would be by population. There is clear evidence to suggest that the definition of what constitutes an urban centre cannot be generalised as it differs from country to country. This indicates that no population-based approach to defining urban centres is globally applicable. Definition of urban centres is often

given by the governments of various countries and therefore differs from country to country.

Urbanisation is projected to continue and by 2030, it is estimated that more than half of the developing world's population will be living in cities. Urbanisation has been defined as the process of accumulation of people, buildings and capital in an areas (Beauchemin and Bocquier 2004). The United Nations suggests that 80% of the growth in population in the next decade will be urban not rural. It is estimated that virtually all population growth over the next 30 years will take place in urban areas of developing countries, with a projected growth rate of 2.4% (Population Information Program, 2004) which is twice the overall annual population growth rate of 1.2% in the developing world. It was said that Africa was the least urbanised continent in the 1980s with three-quarters or more of their population still living in rural areas and most of their economically active population working in agriculture (Obudho and Mhlanga, 1983).

The trend began to change in the 1990s with an increasing proportion of the global population living in urban areas. The current trend in urban population growth will continue and Africa, Asia, Latin America and the Caribbean are predicted to have the highest urban population growth (WHO and UNICEF, 2000). By 2020, it is estimated that the total population in the 27 countries of Atlantic Africa will border around 450 million people with over 50% of the population, about 300 million, residing in the urban areas. Table 1 shows the trend in urban population from the 1960s to 2030 (United Nations, 2002a).

Table 1: Trend in urban population in Africa (in millions)

Year / population									
	1960	1970	1980	1990	2000	2005	2015	2020	2030
Total population	277,398	357,283	469,618	622,443	795,671	887,964	984,225	1,084,540	1,398,004
Urban population	51,280	82,604	128,802	198,192	295,986	354,848	491,709	568,627	739,181
Percentage urban	18.5%	23.1%	27.4%	31.8%	37.2%	40.0%	45.3%	47.9%	52.9%
Rural population	226,118	274,679	340,816	424,251	499,685	533,116	492,516	515,913	658,823

There have been many reasons behind the rapid urbanisation in sub-Saharan Africa, which often does not match up to the economic growth. According to

Satterthwaite (1990), part of the explanation for the rapid growth in the level of urbanisation in many sub-Saharan African nations is simply that they began from relatively small urban bases in 1960. He also argued that part of the explanation lies in the political history of many sub-Saharan African countries, where restrictions on movements to urban centres were lifted with the gaining of independence from colonial powers, who placed restrictions on such movements. Tanzania was cited as an example of the impact of lifting colonial restrictions on population movements. In 1952, 27% of the inhabitants of the colonial capital, Dar es Salaam, were non-African and among the African population there were 1.5 men to every woman because women and children had been strongly discouraged from living with their husbands in urban centres. Currently, most of the increase is the result of migration, reflecting people's hopes of escaping rural privation.

Some of the other reasons (voluntary and involuntary) that force people to move include wars, natural disasters and government evictions. The discussion in this review will concentrate on voluntary migration. The most important factor for urbanisation in developing countries is the change in the economic and employment base. In many countries of sub-Saharan Africa, population movements are essentially responses to where employment is concentrated or where survival is more certain. The primary reason for urban migration is the desire for higher wages and the hope or expectation of jobs and better life, although it has been noted that difference between rural and urban wages is minimal. It is now widely recognised that the informal sector accounts for a large portion of employment and employment growth in urban centres. However, the expectations of better life in urban areas have not been realised by many. The rise in unemployment and underemployment in urban centres in Africa has not deterred rural urban migration (Todaro, 1997). One explanation for this contradiction is the availability and growth of the informal sector, which provides employment in small-scale labour intensive activities such as service provision including water supply and sanitation.

The growth of urban areas is not just as a result of rural-urban migration but can be as a result of natural growth and reclassification. Various studies have

shown that natural growth is main reason for urbanization in Africa. A study by the United Nations indicate that urban growth as a result of natural growth is more substantial in Africa than in any other continent (United Nations 1998). The process of urbanisation is therefore much more complex than just rural-urban migration. Beauchemin and Bocquier (2004) suggest that the declining contribution of migration to urban growth could be explained mathematically meaning that urban population gradually increases compared to the rural population as a result of the diminishing number of rural population that could leave their village. Another suggestion by the authors is that it is a response to a low economic growth. All of the above studies indicate that the recent urbanization in Africa is to a lesser extent due to rural-urban migration but as a result of natural growth.

The rapid growth of cities and towns presents serious challenges. As population increases, the pressure to provide adequate housing increases, especially as urban areas grow and the availability of land, building funds and supplies decreases. Such growth outstrips the capacity to provide employment, housing, services and the rest of the social and physical infrastructure. The quality of life in many African cities is increasingly threatened and urban infrastructure is already under great stress. The impact of urbanisation on services, particularly water and sanitation, is great especially in Africa where it has been reported that most of the countries that are not on track to meet the MDG sanitation target are in sub-Saharan Africa (UNICEF and World Health Organization, 2008).

Governments of various African countries are striving to provide urban services but are desperately battling with sanitation services. Urban centres in Africa and in other developing countries are facing rising poverty levels, and often inadequate public institutions, housing, water and sanitation, and work opportunities. The resulting effect, if these needs are not met, is increased poverty. Growing urban population is a major concern and an estimated 30% of the poor now live in urban areas (Population Information Programme, 2002). This figure is expected to reach 50% by 2035 with most of the urban poor living

in slums and squatter settlements without adequate access to clean water, sanitation and health care.

2.5 Global overview of sanitation

2.5.1 Urbanisation and the sanitary crisis

Every hour, a hundred African children die from diarrhoea, (African sanitation conference, 2002). Diarrhoeal disease accounts for deaths of 2.4 million people (WHO, 2000) making it the third largest cause of mortality among children in the middle and low-income countries (WHO, 1999). In Africa, diarrhoea was ranked 5th in the causes of mortality, about 84% of the global diarrheal disease burden affects children under five (WHO, 1999). The principal cause of diarrhoea is other people's excreta (Cairncross, 1999). The impact of poor sanitation is not just on health but also contributes to malnutrition in children; mental and social development (Bartlett 2003).

Most of these lives could be saved through increased access to water supply, improved sanitation facilities and hygiene practices. Several studies have shown that improved sanitation leads to improved health and nutrition particularly among children (Esrey et al., 1998). The impacts and risks of a lack of sanitation are more acute in urban poor communities as these tend to be much more densely populated and there is less space to dispose of excreta and wastewater (UNICEF, 2000b). Studies into health differentials shows that child mortality and morbidity rates in poor urban settlements equals or exceeds that of their rural counterparts. It is estimated that over half of the world's children (one billion) now live in urban areas in Africa, Asia and Latin America (UNICEF 2000A). Research in Congo found that the prevalence of diarrhoea in children in urban areas to be 3.5 times greater than that of their rural counterparts (Mock, et al 1993). Similar studies in Malawi and Zimbabwe also found higher prevalence of intestinal parasites and worms in urban children (Mason, et al 1986; Phiri, et al 2000). The higher concentrations of people and wastes in urban areas of Africa creates more favourable environment for exposure to diseases pathogens and hence the increasing need for improvements in sanitation and water supply.

In many developing countries, the urban poor spend precious amounts of their time in the morning searching for private and safe places to defecate due to the lack of basic sanitation. Women often have to walk the furthest in search for safer and more private areas, especially in the urban areas. Many end up being raped or humiliated. In Western Europe today, the provision of safe means of excreta disposal is taken for granted unlike in the past when people suffered the same fate (Evans, 2004). Access to 'basic' not to mention 'improved' sanitation as defined by UNICEF and World Health Organization (2008) still eludes many in sub-Saharan Africa.

The midterm assessment of progress towards the Millennium Development Goal for drinking water and sanitation indicates that sanitation coverage is lowest in sub-Saharan Africa at 37% (WHO/UNICEF 2006 and 2004). The majority of this unserved population are primarily located in low-income urban settlements and rural areas. To achieve the target of halving the proportion of people without access to improved sanitation by 2015, an additional 219 million people (20 million per year) need to be provided with improved sanitation. Considering that only 8.4 million people per year gained access to improved sanitation between 1990 and 2000, there is an urgent need to investigate ways of accelerating access to improved sanitation in urban areas of sub-Saharan Africa.

Amongst the reasons for the low coverage of improved sanitation in low-income urban settlements are; low demand and the time taken to stimulate demand, neglect of consumer preferences, weak supply mechanisms, ineffective promotion and low public awareness. Furthermore, key decision-makers are not clear about an overall strategy for sanitation programming and differ on the optimal role for governments, NGOs, private sector, users and external donors in programme implementation. In order to accelerate access to improved sanitation to match with the rapid urbanisation in Africa, there is a need for more effective approaches for large-scale sanitation delivery particularly in low-income urban settlements.

In many African countries, the informal sector – rather than externally supported efforts – provides the majority of household sanitation facilities. Most latrines are built through the natural market i.e. households pay the informal private sector (usually small independent providers) to provide them with latrines. It follows that one of the sustainable ways of improving access to sanitation is to work in partnership with the informal private sector to develop the sanitation market. This would include not only applying commercial marketing approaches to create demand for sanitation but also ensuring that the informal private sector has the capacity to supply appropriate good quality latrines and related sanitation services such as emptying. The case for sanitation marketing has been fully justified by Obika, et al (2005). If the demand for latrines can be increased through sanitation marketing, the responsibility for responding to this demand will potentially lie with small-independent providers.

2.5.2 Sanitation coverage and levels

In order to compare the progress made so far in improving access to water and sanitation, it is necessary to trace the history of water and sanitation access and coverage levels back to the period prior to the water and sanitation decade of the 1990s. This section reviews the progress made in increasing the level of access to improved water and sanitation particularly in urban centres before, during and after the international water and sanitation decade.

2.5.2.1 *Pre-watsan decade*

Sanitation was considered as an important component of health even as early as the First World Health Assembly in June/July 1948. It was referred to as environmental sanitation and was ranked as a top priority on the same level as malaria, maternal and child death, tuberculosis, venereal diseases and nutrition, all considered health problems during the Second World War. Although sanitation was mentioned, it received less attention when it came to action even at this early stage and, as is the case now (Watters, 1988). Sanitation continued to receive less priority, and in 1970, the United Nations set yet another ambitious goal for global improvement of water supply during the Second Development Decade (1971-80) promising safe water for all the urban

population and one quarter of rural population by 1980. These goals were endorsed by WHO in 1972 still without any mention of sanitation.

The early surveys conducted by WHO showed that the percentage of the urban population in developing countries (excluding China and some less developed countries) with access to water supply rose from 71% to 75% in the period of 1970 - 1975 (Agarwal et al., 1981). These global statistics in 1975 showed that 1230 million people in developing countries did not have reasonable access to safe drinking water and even more were without sanitation (Pickford, 1980). The data indicated that the targets might not be reached, which influenced the decision by WHO to reduce the target in 1976. In that year, targets for excreta disposal were included for the first time. The target stated that by 1980, 95% of the urban population should be served with adequate excreta disposal systems (38% through public sewerage systems and 57% by household systems), and 25% of the rural population (no specific system was mentioned).

The trend for setting ambitious water and sanitation targets continued. In 1976, the United Nations Conference on Human Settlement held in Vancouver declared that 'safe water supply and hygienic waste disposal should receive priority with the view to achieving measurable qualitative and quantitative targets serving all the population by a certain date'. The Vancouver declaration was adopted at the United Nations Water Conference held in Mar del Plata, Argentina in 1977 (United Nations, 1997). The conference with the approval of the United Nations General Assembly proposed the International Drinking Water Supply and Sanitation Decade for 1981 – 1990. National Governments were asked to "adopt programmes with realistic standards for quality and quantity to provide water for urban and rural areas by 1990, if possible".

In order to reach the target, it was recommended that national government should commit to providing all people with water of safe quality and adequate quantity and basic sanitary facilities by 1990, giving priority to the poor and less privileged. The conference however, did not define what it meant by *basic sanitary facility*, and the definition was left for individual country governments. The effect of this will be seen later on when WHO conducted a baseline survey

in preparation for the water supply and sanitation decade. The survey conducted in 1980 showed a sharp drop in the percentage of urban population in developing countries served with adequate sanitary facility from 73% to 53%. WHO attributed this to reflection of the different definition of access. The situation may have been worse than presented, as WHO still did include data from large countries like China and Nigeria, and majority of the data were collected from unreliable government sources. The World Health Organization was tasked with co-ordinating the activities of the water and sanitation decade.

2.5.2.2 *Watsan decade*

At the beginning of the decade, the challenge for national governments and the international community was to provide an estimated 1,200 million people with safe drinking water and 1,650 million with adequate sanitation (excluding China) (Watters, 1988). Even at this time, no clear definition was given for adequate sanitation or 'safe drinking water'. With the baseline survey showing that the greatest water supply and sanitation needs were in the rural areas, emphasis was shifted to the rural area during the decade (WHO, 1985). This initiated the shift to rural programmes and low cost technology option for water supply and sanitation (Bourne, 1984).

In 1983, after 3 years of the decade, several countries reduced their original target for water supply and sanitation. Although some progress was made, it was found that very little progress was made in the sanitation sub-sector, especially in the rural areas (WHO, 1985).

The report of the assessment conducted by WHO in 1983 indicated that considerable progress was made in the number of countries establishing national plans and targets for the decade, (increased from 9 in 1980 to 59 in 1981). National governments became increasingly aware of the importance of low-cost water supply and sanitation options. There was also increased awareness of operation and maintenance, importance of community participation and the role of women and NGOs in water supply and sanitation.

The criteria used for measuring progress made were mainly service coverage figures. Like most of the previous data, they were based on national government figures and on the assumption that service coverage in the countries reporting represented the overall situation. The estimated population growth was constant with rapid urbanisation, as was predicted in 1980. Africa with the highest predicted urban population growth had the lowest level of coverage (WHO, 1986). In general, the figures indicate that very little progress was made in bridging the gap between sanitation and water supply, especially in Africa. Although the urban population figures continued to rise in Africa, there was a continued shift in emphasis to rural sanitation with minimal attention paid to urban sanitation.

The decade's first half

The end of 1985 marked the mid-point of the water and sanitation decade and generated much interest among sector professionals to evaluate the progress made so far towards achieving the 100% target. The data provided by government authorities indicated that an additional 1,320 million people had obtained access to safe drinking water and 225 million more people had access to adequate sanitation facilities (Watters, 1988). This demonstrated that that water supply continued to receive a higher priority than sanitation. Even in 1985, no clear definition was given on what is considered *adequate or appropriate sanitation facility*. This could mean that the level of access given for sanitation might actually be lower, as various developing countries' governments had different definitions for appropriate sanitation.

The increase in the number of people served with adequate sanitation in the urban areas in 1985 was 21,550 million compared to the increase in people supplied with safe drinking water, 36,422 million (WHO, 1987). The data, if correct, show that an almost equal amount of effort was made in improving water and sanitation in the urban areas in Africa during the first half of the decade. According to WHO, urban sanitation coverage in Africa rose from 54% to an impressive 73%, which was attributed to a possible distortion that may have been caused by the inclusion of Nigeria and Algeria in the 1985 figures.

The decade's second half

According to WHO (1992), the water supply and sanitation coverage data at the end of the decade indicated that a general advancement of water supply towards the target but all that was achieved in sanitation was to keep pace with the population growth.

Although the decade did not achieve much in terms of the target set, major achievements were made in the development of new approaches to water supply and sanitation. These include the promotion of community participation, greater involvement of women in decision-making, improvement and application of appropriate technologies suitable for operation and maintenance at the community level, and the integration of water supply and sanitation as major components of primary health care.

The impact of rapid urbanisation was more acute in Africa than in other regions. Urban population increase in Africa from 1980 –1990 was 79% as compared with 37% in the Americas, 49% in South-East Asia, 53% in the Eastern Mediterranean and 25% in the Western Pacific Region (WHO, 1992). Progress in the sanitation sub sector in Africa fell far short of expectation as compared to water supply during the decade.

Lessons learnt from the decade

The decade's goal of providing water supply and sanitation for all by the year 1990 was not achieved and increased coverage of water and sanitation services barely kept pace with the population growth over the decade (Carter et al., 1993). By the end of the decade, it was estimated that over 1.2 billion people lacked access to water supply and 1.7 billion lacked access to adequate sanitation facilities. Sector professionals gave varying explanations for the little progress made during the water supply and sanitation decade. Some argued that though the target for the decade was not achieved, valuable lessons were learnt, which can be built upon during decade 2 known as Safe Water 2000. According to Carter et al. (1993), some of the reasons for the apparent failure of the decade include insufficient funding, continued use of unsuitable water and sanitation technology particularly in the rural areas, and weak institutions that are unable to maintain existing service not to mention expanding coverage.

Growth in sanitation coverage was undoubtedly slower than water supply during the decade. Part of the lesson learnt from the decade is the per capita cost of providing sanitation compared to water supply; a median per capita cost of on-site urban sanitation of \$120 in least developed countries, compared to \$60 for standpost water supply was mentioned (Cairncross, 1992). A lot more money was spent on water supply by governments, to boost their political ambitions, and individuals due to the higher demand for water supply than for sanitation. Lack of resources was therefore not the only reason for the slow progress made towards sanitation coverage. The report by Cairncross (1992) supported the argument by Carter et al., (1993) that *technology* had a role to play in the slow progress of sanitation.

Unlike water supply, no one type of sanitation suits all places; it usually requires adaptations to the local conditions. Although there were some efforts made to develop appropriate sanitation technologies during the decade, much less development was made on the approaches for the 'software' aspect, which involves dealing with user behaviour and desires. Urban sanitation, particularly in the low-income settlements posed some problems during the decade. With rapid urban population growth especially at the fringes of city and because of the lack of extension of conventional urban sanitation systems, it was necessary to develop technology options that would be on-plot. Technologies such as VIP and pour-flush latrines developed during the decade had little potential in such areas because they are often located in places of high water table with a potential to flood.

2.5.2.3 Post-watsan decade

The trend in setting targets for water supply and sanitation gained momentum even after the little achievement of the decade. At the World Summit for children in 1990, *goal number 4 was universal access to safe water supply, drinking water and sanitary means of excreta disposal by the year 2000 (UNICEF, 2000a)*, which was yet another ambitious goal. Sanitation began to gain more attention amongst the international community as was made obvious in the 1990 summit for children.

At the end of the decade in 1990, it was estimated that 2.6 billion people lacked access to sanitary means of excreta disposal. The global coverage rose from 51% in 1990 to 61% in 2000 meaning that about 1 billion people gained access to sanitation facilities in 10 years (UNICEF, 2000a). However, the definition of access to improved sanitation was not clear until the year 2000 in the Joint Monitoring Programme by WHO and UNICEF, which may mean that the access figure in 1990 on which the 2000 assessment was based, may not have been anywhere near accurate. Although the 2000 coverage figure indicated an increase in sanitation services, the rapid urbanisation in many developing countries, especially in Africa, is a cause for concern and one that is and will continue to be a major challenge for sector professionals.

When it became obvious that yet another established goal of water supply and sanitation for all by 2000 would not be achieved, the international community began to develop another set of targets. The year 2000 saw the birth a new goal known as **Vision 21**. The goals of Vision 21 include 'the achievement of the Basic Water, Sanitation and Hygiene Requirements (BWSHR) and the target was universal access to BWSHR by 2025 (Appleton, 2000). The definition given for basic water supply was a 'minimum of 20 litres per person per day, for persons who understand their personal hygiene'. Note that no definition was given for basic sanitation. Vision 21, co-ordinated by the Water Supply and Sanitation Collaborative Council (WSSCC) listed 11 core points that summarise major changes that need to be undertaken in order to achieve the goals, amongst which include,

- i. involving people at the centre of planning and action for water supply and sanitation;
- ii. access to hygienic conditions, and basic water and sanitation services as a basic human right;
- iii. water, sanitation and hygiene as entry points to human development and poverty elimination;
- iv. creating an enabling environment for community-driven actions to flourish through good governance;

- v. hygiene and sanitation as a revolutionary priority;
- vi. tackling the challenge of urban sanitation through the promotion of partnerships between users, private sector, NGOs and public agencies;
- vii. institutions as agents of change by supporting democratisation and decentralisation;
- viii. mobilisation for affordable services through equitable financing and cost recovery in order to extend services to the poor

Of particular interest is the prioritisation of hygiene and sanitation for the first time, although it was still number 6 in the list of points for Vision 21, and the breaking of targets into phases (UNICEF, 2000a).

- i. By 2010 to reduce by one third the proportion of households without access to hygienic sanitation facilities and affordable and safe drinking water
- ii. By 2015 to reduce by half the proportion of people without access to hygienic sanitation facilities.
- iii. By 2015 to reduce by half the proportion of people without sustainable access to adequate quantities of affordable and safe water supply.
- iv. By 2025 to provide water, sanitation and hygienic conditions for all.

2.5.2.4 The current era of the 'Millennium Development Goals'

Sanitation began to gain even more attention when the Second World Water Forum held in The Hague in March 2000 endorsed the target of 'reducing by half the proportion of people without access to hygienic sanitation facilities by 2015'. Phase three, which added water supply to the target was also endorsed by the Second World Water Forum and in the United Nations Millennium Declaration, hence the inclusion of water supply and sanitation as a major part of Millennium Development Goal 7. Water and sanitation was also mentioned as being important for achieving goals 1 (poverty reduction), 2 (universal primary education), 3 (gender equality), 4 (child mortality), 5 (improved maternal

health), **6** (HIV/AIDS reduction) and **8** (global partnership for development) (UNICEF and World Health Organization, 2004)

The Millennium Development Goals created the foundation for raising the profile of sanitation and laid out a map to guide various countries in developing long-term plans. The Global Water Supply and Sanitation Assessment Report 2000 (WHO and UNICEF, 2000), guides various stakeholders in developing programmes and implementation plans by providing reasonable baseline data and projections. It provided for the first time clear definitions of 'improved' and coverage figures were based on household data.

Although the target of water supply and sanitation for all by the year 2000 was not achieved, some great achievements were made during this period. The period saw advancements in various low-cost technologies, new participatory approaches for creating demand, particularly for sanitation, were developed, sanitation began to gain more profile than previously and most importantly there was increased awareness of the role of the private sector in service delivery. Tri-sector partnerships between the users, the private sector and the public sector, with NGOs as mediators were being encouraged. New approaches to stimulating the demand for sanitation (e.g. social marketing) particularly in urban areas were also being introduced.

Definition of 'improved' and 'unimproved' sanitation (UNICEF and World Health Organization, 2000).

Improved

- Connection to public sewer
- Connection to septic tank
- Pour-flush latrine
- Simple pit latrine
- Ventilated improved pit latrine

Unimproved

- Service or bucket latrines (where excreta are manually removed)
- Public latrines
- Open latrines

The profile of sanitation has been raised even higher than before both internationally and nationally. Countries in sub-Saharan Africa started making

efforts towards tackling the sanitation challenge. One of these regional efforts was the African Sanitation and Hygiene Conference held in Johannesburg, South Africa in August 2002 and attended by Ministers of various countries (African sanitation conference, 2002). The outcome of the conference formed the basis on which Sub-Saharan African countries advocated for the high profile of sanitation and water supply during the Sustainable Development Summit also held in Johannesburg in 2002. For the first time, sanitation and hygiene was made the top priority in an international conference. The Sustainable Development Summit stimulated the international community to commit to the Millennium Development Goals for sanitation and take initiatives to realise the commitment (United Nations, 2002b). At the General Assembly on the 23rd of December 2003, the United Nations adopted a resolution (58/217) declaring 2005 –2015 as the *International Decade for Action, Water for life* starting on World Water Day, March 2005 (Dieterich, 2004).

Sanitation continued to gain a high profile with 2008 being declared the 'International Year of Sanitation'. The report of the 'progress on drinking water and sanitation, special focus on sanitation' by UNICEF and World Health Organization (2008) described a new way to look at sanitation presenting sanitation coverage as a four-step ladder that includes '*open defecation, unimproved, shared and improved sanitation facilities*' with clear specifications of the types of facilities in each step. This is an improvement on the earlier definitions given in 2000. With the new definitions, it is estimated that 2.5 billion people globally are without access to 'improved' sanitation and the vast majority are in Asia and sub-Saharan Africa.

The reasons for the slow pace of increasing sanitation coverage are well rehearsed amongst sector professionals (Paramasivan and Calagus, undated). Up until recently, sanitation appears to be a basic problem that can be solved by individual households. Recent efforts made by sector professionals and internal bodies have identified that the problem of sanitation is more complex than was originally thought. It involves political, financial, technical and institutional issues (Post, 2002). According to Simpson-Hébert and Wood (1998), the reasons for the slow progress in sanitation include lack of political

will, low prestige and recognition, poor policy at all levels, poor institutional framework, inadequate and poorly used resources, inappropriate promotion approaches, and cross-cutting issues such as demand and taboo amongst others.

2.6 Urban sanitation in sub-Saharan Africa

The United Nations Children's Fund (UNICEF) and World Health Organization (WHO) Joint Monitoring Programme in their midterm assessment of progress report stated that 2.6 billion people globally (the majority in rural areas) are still without access to improved sanitation with sub-Saharan Africa and South Asia having the lowest sanitation coverage (UNICEF and World Health Organization, 2004). In 2006, the sub-Saharan African region still presented one of the lowest sanitation coverage at 37% (UNICEF and World Health Organization, 2006).

The huge gap in rural coverage notwithstanding, current publications are calling for increased efforts to be made in increasing access to improved sanitation in the urban areas, particularly in low-income settlements. Although coverage in rural areas was lower than in urban areas, the report indicated that coverage in slums is much lower than the average for urban areas. It will require an additional four times as many people to gain access as those that gained access between 1990 to 2000 (14.1 million per year, and 1.2 million per month for urban areas alone). This is based on the assumption that the services for the population who already had access in 2000 will be sustained.

This seems very ambitious, as many people with what was termed improved access in 2000 (e.g. pit latrines) in urban areas may not be able to sustain the access when the pits fill up due to the imminent problem of emptying/disposal and the lack of space for new latrines. The number of urban dwellers using improved sanitation rose by 779 million but has not kept pace with the urban population growth of 956 million. Every third person in urban areas of sub-Saharan Africa uses a shared facility (UNICEF and World Health Organization, 2008).

The system usually adopted for urban sanitation is the sewerage system. However, many African cities do not have a conventional sewerage system. The rich and middle income group resort to the use of water closets connected to septic tanks while the majority who are in the low-income group practise open defecation or use poorly constructed pit latrines whose contents are disposed of in alternative places such as the seas, rivers, canals, gullies, etc. The very few cities with a sewerage network often have poorly maintained systems with sewage leaking into the open and contaminating water supply systems through leakage in pipe networks.

Considering that the majority of the low-income groups are either located in informal settlements where public services do not extend or in small towns without a clear institutional framework, providing sanitation services is quite challenging. The types of soil (waterlogged, unstable) where these low-income groups are located also make technology options for sanitation difficult. With the predicted explosion of the urban population, providing the low-income group with improved sanitation will become a bigger challenge that it currently is.

2.6.1 Approaches to urban sanitation provision

Over the past few decades, governments of many sub-Saharan African countries have made immense efforts to increase access to 'improved' drinking water supply for its citizens. In the majority of the countries, this access is yet to be extended to low-income urban settlements. The provision of sanitation is a different scenario where even residents of planned settlements are paying to have their own individual sanitation services.

It is disappointing that in the 21st century most low-income urban settlements in sub-Saharan Africa still have very poor sanitary conditions. Governments of most cities in sub-Saharan Africa are unable to provide the urgently needed sanitation facilities amongst other services, particularly for the urban poor who reside in areas with immense physical challenges in terms of sanitation provision.

In the developed nations such as Britain, sanitation is provided by a range of public and private bodies. Because sanitation is considered very important it is therefore handled with other public health issues overseen by the government. However, the situation in sub-Saharan Africa compares to that of Great Britain in the 19th century when it also experienced rapid urbanisation with the accompanying sanitary crisis. Similar to African nations, the urban poor lived in unsanitary conditions resulting in several epidemics of cholera and other killer diseases (Fisher and Cotton, 2005). It was not until the mid 19th century that organised sanitation systems were established and local authorities were persuaded to take over the responsibility, which resulted in the urban authorities borrowing £7.7 million for sewage works alone (Evans, 2004; Halliday, 1999; and Stanbridge, 1996).

Today in sub-Saharan Africa, governments are grappling with how to provide improved sanitation, particularly to the urban poor. The majority have went ahead to copy the current conventional system in the developed countries without stopping to think about their particular circumstances and conditions. According to Schubeler (1995), three approaches are generally used for the provision of sanitation in urban areas:

- *Conventional urban sanitation:* This is usually the water-borne sewerage system, involving the development of a long-term master plan, (10 – 20 years). The construction of these systems especially in developing countries often commences long after the plan has been completed due to the high cost and lack of funds. In most circumstances, the finished system is far below what was in the original design due to the lack of or mismanagement of funds. The system when completed may not serve its purpose, as urban population may have doubled that on which the original plan was based. Another shortfall is that the sewerage networks are often not extended to low-income settlements let alone new unplanned settlements that have emerged due to the rapid urbanisation. This is the case in many urban areas in sub-Saharan Africa where the sewerage system only serves a very small percentage of the population.

- *Low-cost sanitation approaches:* Low-cost sanitation approaches were made popular during the water and sanitation decade as means of providing improved sanitation to low-income households. The low-cost options are often on-plot (e.g. different types of pit latrine, pour-flush systems and ecological sanitation) but they can also be off-plot such as the condominial sewerage systems. The advantage of low-cost sanitation systems is that residents are involved to some extent in the planning and implementation and they are often community managed. The use of condominial sewerage systems can be effective in informal settlements where on-plot sanitation may not be feasible. The main shortfall of low-cost sanitation options in low-income urban settlements is that the time it takes to get user participation can be quite long and many government agencies or NGOs have a short time limit within which they have to complete the work. Most low-cost sanitation approaches, apart from a few exceptions, remain isolated local efforts with little linkage to the municipal system. Cost recovery is very poor, the potential of the informal private sector is not assessed and utilised enough and the mostly poorly served low-income households are often not reached.

- *Informal service provision:* This is the most common form of sanitation provision for a great majority of low-income settlements in urban areas. Sanitation is provided on an individual household basis or on shared family systems often on-plot. The informal private sector and sometimes community-based organisations provide the services to house owners, who in turn pay the full cost. The disadvantage is that most informal urban settlements are usually unplanned, with poor sanitation facilities because these are provided mostly by people with little or no technical training. The results are poor technical quality of sanitation facilities, uncoordinated, and locally isolated solutions with no effective links to the municipal system, ineffective protection of environmental and public health conditions. Informal service provision is the main focus of this review and the major part of the remaining sections will be discussing their activities.

The conventional urban sanitation, which consists of the water-borne sewerage system is the common approach adopted by utilities. The low-cost sanitation approaches are usually supported by NGOs and externally funded projects and consist of on-plot sanitation options such as the ventilated improved pit latrines and off-plot options such as the small community managed sewerage systems (condominial sewage). The third approach, 'informal service provision' described above is the most common form of sanitation delivery approach in low-income urban settlements and is the focus of this research.

The increasing urban population mainly in low-income settlements and the inability of utilities to extend services to these areas have reinforced the need to seek alternative means of improving access to sanitation. The majority of the houses in cities in sub-Saharan Africa provide their own sanitation either through family labour or mainly by procuring the services of a small independent provider. These sanitation facilities are on-plot technologies ranging from simple dry pit latrines to wet flush toilets.

2.6.1.1 Sanitation technologies in low-income urban areas

The common type of urban sanitation provided by utilities is the conventional sewerage. This technology option is very expensive and requires extensive planning and often does not include low-income settlements. Critics of conventional sewage suggested that it can be eliminated from consideration as a technology for low-income settlements on the grounds of cost and operational mechanisms (Kalbermatten et al., 1982 and Mara, 2005).

Another sanitation technology that has been suggested as the most appropriate technology option for low-income urban settlements is simplified sewerage (Mara, 2005). According to the author, simplified sewerage also known as condominial sewerage is a simplified sewerage systems built with community participation and remained community managed. It's informal nature distinguishes it from the conventional sewerage and the simplified scale makes it easier for settlements to manage. It was first developed in the 1980s in northeast Brazil and has since been tried out in other places including the

famous Orangi project in Pakistan. However, simplified sewerage also requires planning and involves not just the community and the small private sector but also the project sector. Currently, on-plot sanitation is the most widely used technology in low-income urban settlements in sub-Saharan Africa, hence the focus of the thesis. The majority of the SIPS have the skills and long experience of providing these facilities.

As mentioned earlier, most residents of low-income urban areas pay small-scale providers (SIPS) to provide their sanitation. The services consist of the installation of on-plot latrine facilities or pit emptying. The choice of latrine technology that SIPS offer is often limited to on-plot dry or wet sanitation. It is a challenge even to municipalities with skilled resources to provide sanitation technologies that are affordable, technically appropriate, socially acceptable and institutionally feasible (Mara, 2005). On-plot latrines are generally acceptable options in urban low-income settlements as was noted by Saywell (2000). On-plot sanitation options are often lower-cost, can be installed and managed independently of the public utility. Some of the on-plot latrine options that are in use include pit latrines with platform slab (lined and unlined), pour-flush latrines, and ecological sanitation.

The next section examines models of informal sector provision of water supply and sanitation services in low-income urban settlements. It begins with a review of the small-scale providers of water supply, which is much more researched and provides a basis for a more in-depth understanding of the practices of SIPS.

2.7 Informal sector providers of water supply and sanitation

The escalating population, especially in urban sub-Saharan African countries, will mean that the already high density informal settlements will become even more congested and overcrowded with up to 18,000 people per square kilometre. Due to the geographical location of most of these settlements and their 'illegitimate' status, they are unable to obtain services from the public sector. In the absence of utility services, informal sector providers, including small-scale private and non-governmental providers, have stepped in to fill the gap. These providers account for up to 70% of services provision and more. In Dar es Salaam, for example, 69% of households get their water supply and 97% get their sanitation services through small scale independent providers (WSP, 2005). A study of 10 cities in Africa (Collingnon and Vezina, 2000a) reported that an average of 45% of the population are served by non-public utilities.

2.7.1 Defining the informal sector

Informal sector has been defined in many ways including economic activity that is neither taxed nor monitored by a government, and is not included in that government's Gross National Product (GNP). In the context of this thesis, the informal sector is a segment of the economy usually made up of small-scale producers, distributors or providers of goods and services and consists largely of independent, self-employed persons (Water Utility Partnership, 2003).

The key characteristics of the informal sector include ease of entry, very little operational capital, use of skills acquired outside school, use of low level and technology and skills, irregular and competitive market, provide low incomes and unstable employment (Eduardo Mundlane University, 2006, International Labour Organisation, 1998, Omuta, 1986). A key feature of the informal sector that has major impacts on their performance is the difficulty of regulating them hence the government reluctance to recognise them officially. Although the informal sector contributes hugely to the economy of many developing countries, their modus operandi makes it difficult to monitor their activities and

therefore to regulate them. It is often a cash economy with not documented evidence to trace services offered and fees paid.

The informal sector consists of small- and medium- scale enterprises. Small independent providers of water and sanitation fall within this category. To facilitate a better understanding of the small independent providers of sanitation (SIPS), small-scale providers of water supply and other services will be examined in the next section. This will then provide the basis for comparison, as the activities of SIPS have not been studied in as much detail as the small-scale providers of water in low-income urban settlements.

2.7.2 Capacity assessment

Capacity has been defined as the ability of independents and organisations to perform appropriate tasks effectively, efficiently and in a sustainable manner (Horton et. al. 2003; Hopkins, T 1994; World Bank undated; CIDA, 2000). This definition has been chosen, as it closely defines capacity used in this thesis. Capacity in relation to small independent providers of sanitation is their potential to perform and their ability to successfully apply their skills and resources to deliver improved latrines and effective emptying services. The ability of small independent providers (SIPS) to upscale and accelerate the delivery of household sanitation is influenced by their internal environment, which include skills, knowledge or experiences, and type and level of house hold demand; and by their external environment (*enabling environment*). The external environment is to do with policies and bye-laws related to sanitation and the availability of

An important first step towards capacity building is to conduct capacity assessment. This section analyses various capacity assessment methods and formed the bases for developing the methodology used for assessing SIPS capacity in chapter 3 with the results presented and discussed in chapter 4 and 5 respectively. There are several capacity assessment tools that have been developed and used by various organisations (DFID, 2003; CIDA, 2000; Krishnaveni and Sripirabaa, 2008). Although the majority focuses on organisational assessment, they present tools that could be adapted for assessing the capacity of small independent service providers such as the SIPS. There are variations in the definition of assessment depending on the

circumstances. In order to limit the discrepancies, Potter and Brough (2004) suggested that it be focused on the capacity to execute functions independent of changes of personalities, technologies, social structures and resources crises. Whilst some of these factors are applicable to SIPS, others are not. Take technology for example, the ability of SIPS to perform their functions effectively and efficiently is linked to their knowledge and skills of various latrine technologies. In general, many authors seem to agree on three analytical levels when assessing capacity, *organisational; individual and enabling environment levels* (CIDA, 2000; Ramani and Malvalankar, 2009; UNDP, 2006).

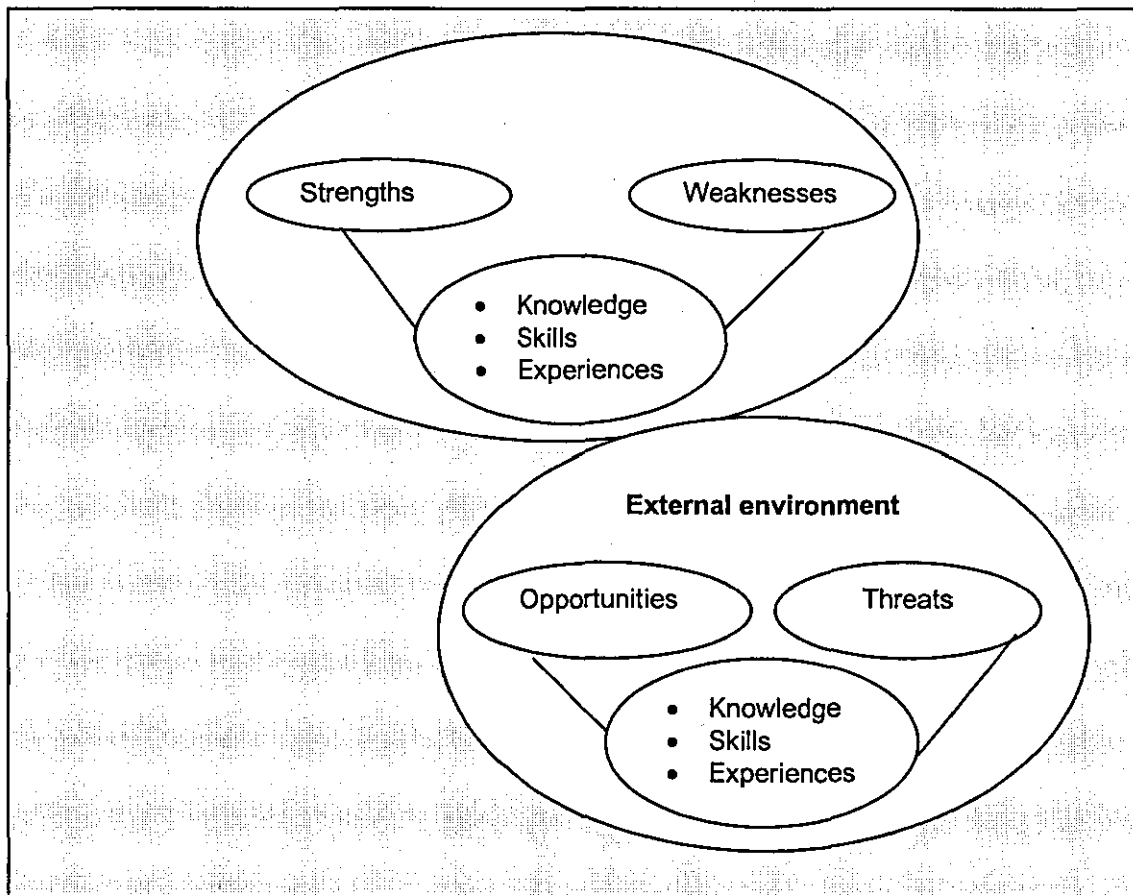
Various institutions focus on different assessment areas depending on whether they are for profit or non-for profit organisations. At the organisational level, the focus is usually on structures, resources, process and management issues. At the individual level, the focus is skills and ability to perform their functions. The enabling environment is related to the broader context in which services are delivered and can either be enabling or constraining. In relation to assessing SIPS capacity, the individual and enabling environment becomes more appropriate, as they do not operate as an organisation.

Some of the tools that have been used for capacity assessment include Participatory Organisational Self Assessment Tool (POET); capacity assessment methodology (UNDP 2007); SWOT, Open System Model and Problem Tree Analysis (DFID 2003). Upon reviewing the various capacity assessment methods, a combination of tools based on the SWOT analysis (Strength; Weaknesses; Opportunities and Threats) was adapted for assessing SIPS capacity to deliver improved sanitation at scale. SWOT analysis is a tool for assessing and conveying the current status of an organisation or individual in terms of its internal strengths and weaknesses and its external opportunities and threats (DFID 2003). The internal environment is related to their knowledge, skills and experiences of performing their functions while the opportunities and threats looks at how the external environment impacts on their performance.

The framework for capacity assessment for the purpose of this thesis is based on the SWOT analysis framework and adapted the methodology by Coates et al

(2005). The authors assessed the capacity of rural water supply and sanitation institutions by first identifying their key functions and then matching staff knowledge, skills and experiences to these functions. Finally, they analysed the impact of the external environment on their ability to perform their functions. This methodology for capacity assessment is represented in figure 2 below and formed the bases for the conceptual framework used for developing the research methodology in chapter 3.

Figure 2. SWOT analysis framework



Adapted from Coates et al (2005)

2.7.3 Typology of small-scale water supply providers

The small-scale providers are involved in various services including water supply and sanitation, electricity, education and health. Although some small-scale providers can be said to be 'formal' because they are authorised and recognised by government, the majority are informal. Some examples of 'formal' providers include private sector operators of schools, small private clinics, and government authorised water tankers (Moran and Batley, 2004). In health and

education, human skill is the key resource, which differentiates them from water supply and sanitation where infrastructure is the major asset (Moran, 2006).

Classifying large private sector involvement in water supply and sanitation seems much easier as it is based on the type of contract. These include consultancy; service; management; build, operate transfer (BOT); lease, concession and divestiture (Green, 2003; Sansom and Franceys, 1997). Attempts have been made by various people to describe small-scale providers based on their characteristics and develop typologies. Some authors have argued that these characteristics are descriptive but that they offer no universal agreements, although they serve some function of classification which is context specific (Sohail, 2003).

Table 2: Typology of small-scale providers of water supply in low-income urban areas

Category	Characteristics	Technology/supply source	Service provision channel
Independent	<ul style="list-style-type: none"> • Not connected to utility • Develop own source • Often sole proprietor • Unauthorised and unregulated 	<ul style="list-style-type: none"> • Boreholes • Unprotected springs and wells • Rivers and streams 	<ul style="list-style-type: none"> • Piped network • Mobile carriers (water tankers/vendors) • Single point source (stand pipe/hand pump/well)
Dependent	<ul style="list-style-type: none"> • Dependent on utility piped network for their supply • Usually authorised 	<ul style="list-style-type: none"> • Install and manage extensions or water points in areas unserved by utility • Buy and deliver water direct to customers willing to pay them 	<ul style="list-style-type: none"> • Individual resellers of home water (informal standpipes) • Local sub-network providers • Standpipe or water kiosk operators • Water carriers and carters • Water tankers

Small-scale providers of water can be divided into two broad categories, independent and dependent (Kariuki and Schwartz, 2005). Independent providers are those that own their own source of water supply or electricity, while the dependent groups, also referred to as 'intermediate' service providers by Moran and Batley (2004), depend on the formal public utility for their water or electricity supply. Although other sectors such as electricity, health and

education were mentioned, focus for comparison purposes is on water providers. Table 2 above summarises the typology of small-scale providers of water supply based on various literature (Conan, undated, Kariuki and Schwartz, 2005, Moran, 2006, Moran and Batley, 2004, Sansom, 2006, Snell, 1998, Solo, 1999).

2.7.3.1 Strengths of small-scale providers of water supply

Peri-urban settlements are usually the last to get services from water and sanitation utilities. Various studies have shown that small-scale providers of water supply play a major role in extending services to areas not served by utilities, particularly areas inhabited by the urban poor (Solo, 2003). Some of the strengths of small-scale providers of water supply include:

- *Innovative technology:* They develop and use innovative low-cost technologies where utility services are unable to reach.
- *Demand responsive:* Their ability to respond to user demand by modifying service delivery schemes to suit their various customers. For example, customers can have water delivered in bulk to their houses or carted in smaller quantities. Households can also obtain their water from fixed point supply often at a cheaper rate than when it is delivered to the house.
- *Independent:* Many providers are independent of the utility and have developed their own sources of water supply making their services available anytime.
- *No geographical boundaries:* They are not limited by boundaries and every type of neighbourhood has its own small-scale providers of water supply. They service both legal and illegal settlements.
- *Capacity to grow:* Small-scale providers can be flexible and can also grow with demand. They are able to reinvest their profits and expand their services.
- *Self financing:* They are able to mobilise funds independently to enable them to install water points or purchase transportation vehicles. They do not depend on government or donor funds to operate their services.

- *Cost recovery:* Unlike public utilities, small-scale providers seem to be able to set fees to recover costs even in areas where it was thought impossible.

Whilst small-scale providers have numerous strengths and advantages particularly regarding their ability to reach the unreached, they also face some challenges that have impacts on their service provision capacity. The next section examines some of the weaknesses and constraints of these providers.

2.7.3.2 Constraints of small-scale providers of water supply

Some of the main weaknesses of small-scale water supply providers include their weak business management skills and the tendency to resort to informal credit facilities to raise capital for their operations (Danert et al., 2003). It has also been noted that due to the lack of government regulation of this sector, they have a tendency to supply unsafe water and at a high price; charges which were refuted by Collingnon and Vezina (2000) in their study of 10 cities in Africa.

The main constraints to the expansion of services provided by small-scale providers as noted by Snell (1998) include: lack of access to formal credit facilities for capital investment; lack of transparent procedures for handling money and ensuring accountability and security in the face of unfair competition from subsidized public services; or confiscation of equipment and source. In the report of the independent water entrepreneurs in Latin America, Solo (2003) pointed out that the independent providers face a difficult environment for investment and business development. They operate in legal limbo and face pricing and other restrictions, as the regulatory frameworks for water production and distribution were conceived for large monopoly providers.

One constraint that has come out strongly from various authors is the institutional and legal framework under which the small-scale water supply providers operate. The government policies for small-scale providers of water supply are unclear, inappropriate and in many countries non-existent (Sohail, 2003). Some of the indicators of inappropriate public policy framework pointed out in the study of ten cities by Collingnon and Vézina (2000) include:

- *Lack of communication with public authorities:* It pointed out the absence of any dialogue between small-scale providers and public authorities. This is attributed to the lack of any professional body to represent the small-scale providers, because they are usually considered 'illegal', the authorities tend to ignore them and turn a blind eye to their activities.
- *Lack of independent regulatory authority:* Although independent water regulating bodies have been introduced in some African countries, they do not cover the informal sector, which includes small-scale providers. This has resulted in their services not being monitored or regulated. A similar study in peri-urban areas of Maputo in Mozambique also came to the same conclusion (Matsinhe et al., 2008). Regulating these providers provides some challenges because they are small-scale and informal in nature. For example, it will be impractical for a regulator to gather information on the varying costs of a small-scale water provision and then regulate them on a fair basis (Sansom, 2006). The regulation of the informal small-scale providers of water supply is almost impossible.
- *Urban development policy vacuum:* The accelerating growth rate of cities in sub-Saharan Africa coupled with the consistent absence of public policy to deal with the growth has led to the mushrooming of unplanned illegal settlements in land difficult to provide services. Although this has led to more opportunities for small-scale independent providers, it has increased the cost of their services.
- *Abuse of monopoly power:* Public utilities and private companies with concession contract tend to defend their areas fiercely. They set fixed prices, which limit the flexibility of small-scale providers to respond to user demand. It could also result in small-scale providers not being allowed to operate in the areas under the concession.
- *Lack of access to formal credit facilities:* The modern banking sector does not offer loans to small-scale informal providers of water supply except when they are making a capital purchase, which can be used as collateral for the

loan. Small-scale providers often resort to alternative means of raising capital and then limit themselves to smaller short-term investments to minimise their risk.

- *Exclusion from utility contracts:* Small-scale providers are unable to bid for public works contracts, which are monopolised by large private sector enterprises or a few contractors that end up sub-contracting small-scale providers at a much reduced rate to provide the services.

2.7.3.3 *Improving policy environment for small-scale providers of water supply*

Regulations are not always positive, as they can either suppress market operations or provide market conditions. The government response to informal small-scale water supply providers is usually to suppress their activity rather than to enable improvement in their provision. It is only by promoting policies that further the development of small-scale providers that access to water supply can be maximised, particularly in low-income urban settlements (Chenoweth, 2004). There are several ways by which the policy framework can be improved to better expand the services of small-scale providers of water supply in urban areas.

Recognition and formalisation: Recognition by government utilities is the first step towards regulating the services of small-scale providers. Government should desist from regarding them as 'illegal' and rivals because they are capable of extending services to areas where utilities are unable to reach. Recognition is the critical step towards regulating small-scale providers. Some authors have suggested formalisation of the informal small-scale providers, which will enable them to comply with government requirements for official recognition (Moran and Batley, 2004). However, many informal small-scale providers may not want to become formal, moreover, it could also lead to them losing their flexibility to respond to their customer demands. Moran and Batley (2004) suggested creating conditions whereby informal small-scale providers that wish to 'go formal' will have access to credit, information, training and other

resources. Once they are recognised, government can work out contractual relationships with small-scale providers.

Providing legal security: Small-scale independent providers tend to avoid long term investments because they fear the penalties from the government as they are considered to be operating 'illegally'. The result is an increase in their operational costs, which in turn leads to them raising their service rates to cover the costs.

Contracting small-scale providers: Reducing the bidding, licensing and other requirements will enable small-scale providers to compete for public sector works. It will not only create an opportunity for a competition but could lead to lowering of rates paid by the consumers.

Supporting small-scale providers: This can be done by creating an enabling legal environment, providing training to the providers whom the urban poor use most, providing access to credit and reorganising contracts to give more access to small-scale providers. Government can also restructure the markets by taking on a purchasing and commissioning role, contracting and providing licences.

2.8 Small independent providers of sanitation (SIPS)

All over the developing world the majority of the urban poor depend on small-scale providers for their sanitation services (WSP, 2005). Little is known about these small-scale providers of sanitation services but they are usually independent individuals. They are referred to in this thesis as small independent providers of sanitation (SIPS). These individual manual labourers, masons and others that provide sanitation services directly to the household and are part of the informal sector. Their central role in sanitation provision in low-income urban settlements in sub-Saharan Africa has been gaining more interest and sector practitioners and researchers are beginning to examine their activities.

In a study of 10 cities in Africa by Collingnon and Vézina (2000), an average of 91% of the urban residents were said to be dependent on the small independent providers for their sanitation services. These groups of providers have been ignored in the past by utilities and government because they were

thought to offer only temporary solutions. The inability of the utilities to extend sanitation services to the low-income urban areas convinced sector practitioners that any improvement in sanitation services must be in partnership with the SIPS. The impending urban population escalation has further highlighted the need to look into the activities of the small independent providers of sanitation. However, very little study has been conducted on this group unlike their water supply counterparts.

The remainder of this section focuses on describing the typology of SIPS, examining their activities including strengths and weaknesses, reviewing their constraints and the policy environment in which they operate. The section will also compare SIPS with their water supply counterparts and possibly those involved in electricity supply.

2.8.1 Typology of small independent providers of sanitation

There is not much literature on the typologies of small independent providers of sanitation. Although there are existing publications on 'small-scale providers of water supply and sanitation', the majority usually focus more on small-scale water supply providers. The classification of SIPS in this thesis is based on the type of services that they provide ranging from manual labour sanitation-related jobs to sludge removal and treatment. As pointed out earlier on in the chapter, SIPS mainly provide on-plot sanitation technologies.

The majority of the SIPS that provide sanitation services to low-income urban settlements, unlike their water supply counterparts, are typically independent, as they do not rely on public utilities for their services. In a study on SIPS in Kibera, Kenya (the largest low-income urban settlement in sub-Saharan Africa), WSP (2005) identified three major categories of SIPS; *latrine construction*, *latrine emptying* and *latrine management*. Two other groups that can be added to this category are *sludge treatment and disposal providers* and *sellers of latrine building materials and components* (Collingnon and Vezina, 2000, Moran and Batley, 2004).

The classification shown in table 3 is based on the descriptions of SIPS by various authors (Collingnon and Vezina, 2000, Sansom, 2006, Scott, undated,

Snell, 1998, Solo, 1999). SIPS classification is discussed in detail later on in the chapter.

Table 3: Typology of small independent providers of sanitation (SIPS)

Category	Service type	Technology
Latrine construction	<ul style="list-style-type: none"> • Pit diggers • Builders (masons) • Carpenters (for roofing superstructure) 	<ul style="list-style-type: none"> • Pit latrines • Flush latrines • Composting latrines
Latrine management	<ul style="list-style-type: none"> • Owner/operator/franchisers of public latrines and bathing facilities. • Community managed latrines 	<ul style="list-style-type: none"> • Public pit or flush latrines • Public latrines combined with baths
Latrine emptying	<ul style="list-style-type: none"> • Manual cleaning services (e.g. bucket latrines) • Manual pit emptiers • Mechanised manual latrine emptiers • Septic tank suction trucks 	<ul style="list-style-type: none"> • Mainly pit and flush latrines
Sludge treatment and disposal	<ul style="list-style-type: none"> • Private sludge treatment plants¹ 	<ul style="list-style-type: none"> • Mainly sludge from flush latrines
Suppliers	<ul style="list-style-type: none"> • Private sanitary mart operators • Retailers of latrine construction materials and components 	<ul style="list-style-type: none"> • Mainly pit and flush latrine components

2.8.2 Characteristics and operational mechanism

The characteristics and operational mechanisms described in this sessions is based on the publications listed in the last paragraph of section 2.81 and also largely on the author's experiences. There are certain characteristics and operation mechanisms that set one category of SIP apart from another and even within the same category. Unlike in water supply, the majority of sanitation-related services are provided by men.

Beginning with 'latrine construction', the SIPS in this category use simple tools hence the minimal capital cost required for initial set-up. They are usually unregulated, unrecognised officially by government and are therefore not taxed. The majority are resident in the low-income areas and their services are usually restricted to similar settlements. Pit diggers are typically manual labourers often residing in and around the low-income settlements. Although they do not have

¹ The study of 10 cities in Africa only found one small private sludge treatment plant in Cotonou Collingnon, B. & Vezina, M. (2000a) Independent water and sanitation providers in Africa countries. Full report of a ten-country study. Washington, DC, WSP.

to have specialised skills such as masonry, they are familiar and experienced with pit digging in the kind of difficult soil conditions found in low-income urban settlements. Masons have the main responsibilities of lining latrine pits, fabricating slabs where required, completing the platform and in some cases building the superstructure.

Latrine builders are usually masons that have acquired their skills outside of school but learnt on the job. They are usually general masons that build mainly houses but also work on latrines when required. This means that the majority of them do not have any particular training on latrine construction. Carpenters are only involved in the construction of a few latrines when it comes to the roofing of the superstructure. However, the majority of the latrines in low-income areas rarely get to this stage (Collingnon and Vezina, 2000, WSP, 2005).

SIPS in the 'latrine management' category include owners, operators or franchisers of public latrines and bathing facilities. This group do not actually have any particular latrine building skills but pay others to build the latrines. Their responsibilities include collection of fees, cleaning and maintaining the latrines. Owners of these facilities require fairly large initial set-up capital, as they have to build the structures and in some cases ensure that there is a water connection. This category of SIPS is usually recognised by the government, as they do require some official approval before they can construct the facilities. They start small and over time, expand to a medium-scale enterprise with the possibility of acquiring loans from the formal banks such as the Sulabh centres in India (Snell, 1998).

The 'latrine emptying' category consists of SIPS that carry out manual cleaning services and pit emptying, mechanised manual emptying and septic tank suction truckers. Manual cleaners carry out the cleaning and emptying of bucket latrines. This technology has been generally phased out in many countries in sub-Saharan Africa except for a few such as Ghana. Manual emptiers use a few crude tools with no protective gear and therefore do not require large initial set up cost. They are usually manual labourers with no specialised training but often belong to a 'special' group almost like a cult. They often work together in

small groups and also do other manual jobs such as sweeping and load carrying to supplement their income when there are no emptying jobs (WSP, 2005). According to the study by WSP in Kibera slum in Kenya, a small group of manual emptiers would require about (US\$39 – US\$104) to buy equipment, which individuals working alone are not able to afford. This group of SIPS are not willing to discuss their activities openly because of the low social status, which may explain why there is very little literature on them.

Mechanised manual latrine emptying in many instances takes place in funded trials where manual emptiers have been given small suction vehicles by NGOs or international organisations such as the UN-Habitat vacutug. These small machines are supposed to be able to negotiate the narrow lanes of most low-income settlements where large mechanised trucks are unable to reach. The ten city study by Collington and Vézina found these operational in only 3 countries, Kenya, Mali and Uganda, although it has since been expanded to others including Dar es Salaam in Tanzania.

Septic tank suction truckers are said to be most organised of the SIPS. They are found in the majority of the cities in sub-Saharan Africa and provide services mainly to middle and high-income settlements. They require some form of official registration in order to be permitted to dispose of sludge in the public treatment plants. Similar to the manual emptiers, they often work in a small group of 2-5 persons including the driver and the suck pump operator. The initial set-up cost can be significantly high mainly due to the cost of purchasing the truck. They are semi-formal in many countries where they form an association that fixes prices for the services that they provide. This group of SIPS is not the main focus of this thesis, as they rarely service the low-income urban settlements. The cost of suction truck emptying is not much more than manual emptiers (at US\$30 – 60 for 6 – 10 cubic metres) but is unsuitable for the majority of the latrines in the low-income urban settlements whose contents consist not just of sludge but also solid wastes

'Sludge treatment and disposal' category consists of SIPS that operate private treatment plants. Only a few of these are in existence and were reported in the study of ten cities by Collingnon and Vézina (2000).

'Suppliers' of latrine products include small retailers or private sani-marts where households can purchase latrine components. Many cities in sub-Saharan Africa have these types of shops that sell latrine building materials from sand to squat pans. These retailers target the low-income group, as they sell building materials in smaller quantities. For example, cement is measured in cups instead of the 50kg bags and sand is also sold in 15litre cans.

2.8.2.1 *Advantages and strengths of SIPS*

SIPS are the 'Saving Grace' for the majority of the residents of the low-income urban settlements in many African countries. They provide more than 90% of the urban poor with their sanitation requirements be they inappropriate in most cases. Although the important role of SIPS in urban areas is not officially recognised by most governments, they are key players for improving sanitation in urban poor settlements. The main strengths of SIPS are as follows;

- *Flexibility:* SIPS fall under the low-income group and are usually resident in informal settlements. They therefore understand the situation of households in these settlements and are flexible in terms of payments. They are able to offer house owners the opportunity to pay in instalments, which formal business set-ups are not willing to do.
- *Independent:* One of the key strengths of SIPS is that the majority are independent, which gives them flexibility and the ability to respond to their customer demand. Unlike their water supply counterpart, the majority are not dependent on government utility or a source to provide their services.
- *Demand responsive:* SIPS are the main sanitation service providers in informal settlements and have no boundaries in terms of where they work. They are able to build latrines to suit various groups of customers regardless of their income. Because they are not officially recognised and are therefore

not regulated, they are able to offer services that are considered illegal such as disposing of sludge in canals and open water bodies.

- *Innovative technology:* SIPS are conversant with and are able to adapt low-cost latrine technologies for the challenging conditions in the low-income settlements. An example is the digging and lining of pits in the unstable soil conditions that exist in these areas. They have also adapted various latrine technologies to suit the conditions and the 'pockets' of their customers.
- *Competition and pricing:* Because the majority of SIPS are independent and do not have formal organisations, the prices for their various services are negotiable depending on the amount of work and the number of SIPS in any particular location. It is not uncommon to find one particular latrine with over 5 prices. The prices are normally labour costs, as the customers buy all construction materials. Prices for services can change even after they have been negotiated and agreed. Unlike their formal counterparts, once the bidding process has been completed and contract agreed, it is usually not altered.

2.8.2.2 Constraints of SIPS

Although the majority of the urban poor population rely on the SIPS for their sanitation (Solo, 1999; 2003), the sanitation in these areas is generally poor and does not really serve the main purpose of preventing human contact with excreta. The reasons for the poor standards of sanitation have a lot to do with the weaknesses and constraints of the SIPS but also with the conditions of the settlements that make technology solutions difficult, and the financial status of the households. There is limited information on the constraints of SIPS, as the majority of the publications are directly related to small-scale providers of water supply.

Some of the SIPS strengths mentioned earlier are also what constitute their weaknesses. These include the lack of appropriate technology, lack of skills, emptying and disposal difficulties, lack of accountability, unfavourable policy environment, lack of access to working capital, and inability to generate demand for improved latrines, amongst others. These constraints were compiled from

various literature combined with the author's personal experiences (Collingnon and Vezina, 2000a, Mehta and Virjee, 2003, Scott, undated, Snell, 1998, WSP, 2005).

Technology:

- Technology is one of the major constraints faced by SIPS to upscaling the delivery of improved sanitation in urban poor settlements. On-plot sanitation technologies, particularly pit latrine options, are often the most preferred options amongst residents and also SIPS. Recent evidence has shown that these on-plot options have some maintenance and sustainability issues.
- The nature of the majority of low-income urban settlements makes on-plot sanitation inappropriate. The unstable soil makes it a life threatening experience for SIPS involved in latrine construction. In the rainy season, flooding is a common occurrence, and sometimes the pit contents are forced into the open creating a favourable environment for epidemics.
- Conventional sewerage is almost impossible due to costs and the fact that the urban poor areas are considered 'illegal' places them on the lowest step in the 'ladder of priority' for public utilities. Condominial sewerage being promoted by some authors requires official recognition of informal settlements by government, organisation of residents and SIPS to be retrained.
- The technology constraints, which are beyond the remit of SIPS, and the looming urban population explosion emphasises the need to develop appropriate technology to respond to the demand in order to avoid future pandemics.

Emptying and disposal

- Many of the on-plot latrine technologies present emptying challenges. Due to their design and the nature of the pit contents, manual emptying is often the most preferred emptying approach by all. This involves SIPS using simple tools with no protective gear to dig out the pit contents. It is such a degrading and inhumane job that SIPS that provide emptying are regarded as the lowest of the low in the society and yet their services are indispensable.

Because of the nature of the pit contents and the road network in low-income urban settlements, it is very difficult if not impossible for large suction trucks to empty on-plot latrines.

- Sludge from pits is usually disposed of in freshly dug pits near the existing latrines or in open spaces. Inadequate or no access to sludge treatment plants makes it difficult to dispose of sludge from on-plot latrines. The reasons include: the distance of the treatment plants far from the settlements making it impossible to physically transport excrement; and the potential inability of SIPS to recover their costs because of the charges levied for dumping sludge.
- SIPS are often prosecuted for dumping sludge in the open spaces but at the same time, public utilities and municipal government have failed to provide them with suitable practical alternatives. Emptying and disposal of sludge will continue to be major constraints as long as the existing on-plot technology is used and governments fail to recognise and support SIPS.

Skills of SIPS

- The issue of the appropriateness of the existing technology is one thing but the skills of SIPS is also a critical issue in upscaling the delivery of improved latrines. The ability of SIPS to innovate to meet market demands is one of the characteristics that most commentators suggest is its great strength as noted by many authors (Mukherjee and Josodipoero, 2000). However, SIPS, unlike their water supply counterparts are limited by their skills and innovative ability to provide appropriate sanitation services. They mimic technologies provided in government or NGO projects.
- The majority of the SIPS acquire their skills from outside of a formal training establishment and therefore have no system of certifying that they are qualified to provide sanitation services. Most SIPS are either manual labourers or general masons with no special training on the construction of latrines (Collingnon and Vezina, 2000a). This is demonstrated by the quality of the services provided and the inability to make appropriate innovations to provide improved sanitation. The services on offer may not necessarily match

the preferred options by households who mainly see them as 'interim' solutions until NGOs or even government programmes deliver the improved facilities.

- Although there is limited information on the capacity of SIPS (knowledge, skills and experiences), the types and quality of latrines in low-income urban settlements demonstrate the limited capacity of SIPS. If SIPS are to play a major role in responding to the demand for improved sanitation for the urban poor, there is an obvious need for their skills to be improved. How this will be done effectively is another issue.

Demand generation skills:

- Unlike water supply, the demand for improved sanitation needs to be generated. Unfortunately, SIPS do not only lack the skills to generate this demand but also lack the necessary knowledge of improved sanitation options (Obika, et al 2005). It is impossible to ask someone with limited knowledge of what constitutes improved sanitation to convince households to pay for them.
- SIPS usually combine providing sanitation services with other jobs to supplement their income. Because of their 'small' and 'independent' nature, SIPS are unable to investigate what their potential customers value in a latrine and to adapt designs to suit demands (WSP, 2005). This calls for improved understanding of the market (household) desires and stresses the need for strong marketing of improved sanitation to convince the urban poor to spend slightly more or even accept improved sanitation. The experience in Bangladesh and Benin suggests that strengthening the marketing skills of the small-scale private sector can deliver significant improvements in generating interest in acquisition of improved sanitation (WSP, 2002). Sanitation marketing is defined as the use of commercial marketing principles to promote the adoption of improved sanitation, whereby appropriate sanitation options are identified and promoted at affordable prices, and are easy to purchase (Weinreich, 1999).
- Another important aspect of generating demand for sanitation is the inability of clients to make contact with 'certified' latrine builders or emptying services

providers to get information on reliable information. SIPS lack organisation and are therefore not certified and as a result anybody could claim to be one. Although operating as 'independent providers' gives them flexibility, it also means that they are often not contactable, as the majority have no fixed address.

- Generating demand for sanitation is another area that can be said to be beyond the limits of SIPS. They have limited intellectual, financial and organisational ability to investigate what the clients want and make adjustments to respond to this demand. The question then is, 'are we expecting too much from SIPS'? Section 2.10.2 demonstrates the impracticality of expecting SIPS to bear the responsibility of generating demand for improved sanitation.

Limited investment capital

- The majority of the SIPS have very little capital and access to credit for initial investment and as a result can only afford to buy basic tools. The manual pit emptiers for example use very simple tools and cannot afford to buy protective gear (Scott, undated, WSP, 2005).
- Because SIPS work alone, they cannot afford to risk investing in expensive tools considering also that the sanitation jobs are not regular. Although SIPS are able to adapt payment systems to allow their customers to pay in instalments, they have limited working capital and are therefore unable to offer credits (Mehta and Virjee, 2003).
- In many situations, the household must supply the materials and they pay the mason or pit-digger a down payment for construction. This process ultimately leads to lengthy disruption in the acquisition process, as households themselves lack immediate access to capital to finance the improvements. Identifying mechanisms by which the small-scale private sector operators can accumulate working capital to be able to deliver products within a short period of time, and hence increase rapidity of payment needs further research.

- It is tempting to advocate for the development of credit schemes for sanitation, either through providing small businesses with grants or loans to allow them to develop working capital and thus speed up the process of sanitation provision. The potential for providing households with low or no-interest loans to acquire sanitation facilities is also attractive. However, the benefits of both these approaches require further consideration. Although there have been cases where credit schemes for small businesses have had some success, in other cases, there have been problems. For instance the collapse of the co-operative bank in Uganda left many small businesses bankrupt (WSP 2003). It is important that short-term access to credit schemes does not result in either prescription in relation to technologies that may be provided or that it compromises long-term provision by distorting market practices in a way that cannot be sustained beyond a short period of time. This has particular relevance when considering on-site sanitation provision, as long-term maintenance requirements, such as pit emptying, may be compromised.

Public policy environment

- Collingnon and Vézina (2000) in their study of independent water and sanitation providers emphasise that the major constraints facing these providers are institutional and legal, which stem from the lack of an appropriate policy framework. Although their focus was mainly on small scale providers of water supply, some of the issues they identified also affect SIPS. One factor that they mentioned was SIPS lack of communication with authorities. Because they are informal and independent they do not have a voice to speak on their behalf to the government.
- It is generally known that SIPS play a key role in providing sanitation services to the urban poor, they are not officially recognised and the authorities often turn a blind eye to their activities but at the same prosecute them for dumping sludge openly. The authorities have failed in many countries to provide them with designated places to dispose of sludge. This lack of support and recognition will continue to have major impact on the SIPS ability to respond to the demand for improved sanitation.

- SIPS are not regulated and do not have a self-regulating body to oversee the activities of its members. This is seen as one of the strengths of SIPS because it gives them flexibility and creates an open market competition. However, it is also a constraint, as anyone can claim to be SIPS because there is no system for certifying SIPS with the appropriate skills or an association to represent them.
- Although SIPS have provided more sanitation in the urban area in sub-Saharan Africa than most government and externally funded projects put together, still very little is known about the process of latrine provision and their capacity to respond to the demand for improved sanitation, and the impact of the policy and regulatory environment on their activities. SIPS are even more constrained than their water supply counterpart; they are limited on their ability to upscale the delivery of improved sanitation without the enabling environment.

2.8.2.3 Comparing SIPS with small-scale providers of water supply

Most authors often lump SIPS together with small-scale providers of water supply as if they are affected by the same issues. Considering the importance of sanitation and the impact of the lack of sanitation on the public, SIPS deserve better attention and more in-depth study to understand how they can be supported to improve the delivery of sanitation services. This section compares SIPS with small-scale water supply providers in order to highlight the similarities and differences between them (see table 4). It also demonstrates that SIPS have many more limitations than small-scale water providers in terms of the level and quality of sanitation services that they can offer.

The review has so far looked into population growth and urbanisation and its impact on sanitation. It also covered urban sanitation provision and examined the activities of small-scale providers of water supply. The remainder of the review after this concentrated on small independent providers of sanitation, their strengths and constraints and how they compare with small-scale water supply providers. The review touched briefly on two important issues (demand generation and enabling policy framework) that have major impacts on SIPS

capacity to respond to the demand for improved sanitation in low-income urban areas. The next two sections have been used to examine these two issues and highlight what information there is.

Table 4: Comparison between SIPS and small-scale providers of water supply

Issue	SIPS	Small-scale water supply providers
Technical skills	<ul style="list-style-type: none"> Latrine construction especially in low-income urban settlements requires some technical skills. SIPS need to learn how to dig pits safely in unstable soil with high water table, masons need to learn how to line pits safely and what type of materials to use. 	<ul style="list-style-type: none"> Small-scale water supply providers do not necessarily require technical skills in order to deliver water to their customers. They either pay for boreholes to be drilled or to be connected to the public network and in some cases get water from others or get it free from surface water.
Waste management	<ul style="list-style-type: none"> SIPS have the responsibility to install, empty and dispose of the sludge from the latrines. They have to devise mechanisms for emptying various latrine technologies and disposing of the sludge even in the face of public sector prosecution. 	<ul style="list-style-type: none"> Small-scale water supply providers are only concerned with delivery of water to their customers or have the customers come to collect the water themselves to cut cost. It is not their responsibility to deal with waste water, hence reducing the burden on them.
Dependent on public facility for supply	<ul style="list-style-type: none"> Latrine construction does not require public utility facilities, as they are mainly on-plot options. 	<ul style="list-style-type: none"> Some small-scale providers depend on the public utility for their source of water supply through pipe networks. Others may require government approval before drilling boreholes.
Dependent on public facility for disposal	<ul style="list-style-type: none"> Mechanised manual and suction truck operators need to dispose of sludge in government facilities. Although manual pit emptiers do not often dump sludge in government facilities, they are required by law to do so and get prosecuted when caught dumping elsewhere. 	<ul style="list-style-type: none"> As mentioned earlier, waste water disposal is the responsibility of households and not the small-scale providers.
Flexibility	<ul style="list-style-type: none"> SIPS are flexible in their service provision. They do not have geographical or socio-cultural boundaries. They can fix prices for their work independently due to the lack of a representative association. 	<ul style="list-style-type: none"> Small-scale providers are also flexible with unlimited boundaries. However, they often form some associations to enable them to fix prices and speak to the utility as one strong voice.
Location conditions	<ul style="list-style-type: none"> The conditions of the settlements have an impact on the type, quality and cost of sanitation. Areas with known 	<ul style="list-style-type: none"> Conditions of settlements do not generally have an impact on the services of small-scale providers but large water truckers may charge

	unstable soil and high water table will cost more to build latrines and can potentially be life threatening for SIPS.	slightly higher than normal to deliver water in areas with poor roads.
Demand	<ul style="list-style-type: none"> • The congestion in the low-income urban areas has made latrines a necessity and as a result, the majority of households pay to install the cheapest latrines possible. • The demand for improved sanitation needs to be generated in order to persuade the urban poor to change their attitudes. 	<ul style="list-style-type: none"> • Water is such a necessity that the urban poor often pay much higher than utility provided services. There is no need to invest in demand generation, as no one can do without water.
Income	<ul style="list-style-type: none"> • Income from sanitation is irregular and SIPS often do other jobs to supplement their income. 	<ul style="list-style-type: none"> • Income from water supply is more regular and can even increase in the dry season. There is constant need for water and the majority of small-scale providers are the only regular and reliable source in most low-income settlements.
Demand responsive	<ul style="list-style-type: none"> • Although SIPS are said to be demand responsive, they are limited on the type and quality of sanitation services that they can provide to their clients. 	<ul style="list-style-type: none"> • Small-scale providers are demand responsive and can tailor their services to suit various clients.
Public policy framework	<ul style="list-style-type: none"> • The majority of the SIPS are not recognised officially by the government and do not have the enabling environment to function effectively. • SIPS need public authority support with sludge disposal including easy access to waste treatment plants. 	<ul style="list-style-type: none"> • Small-scale providers also need an enabling policy framework and support to be able to extend their services to areas that are not reached by utilities.
Health and safety	<ul style="list-style-type: none"> • SIPS are faced with the threat of pit collapse, and health hazards associated with pit emptying and sludge disposal. 	<ul style="list-style-type: none"> • There are minimal threats to life for small-scale providers of water supply.
Capital investment	<ul style="list-style-type: none"> • SIPS do not have access to credit and are unable to invest large capital in their operations except for mechanised suction truck operators. • Income from sanitation is irregular and in order to minimise risk, SIPS invest minimal capital, as they see it as a temporary job and will quit as soon as they find better and more regular paying jobs. 	<ul style="list-style-type: none"> • Some of the small-scale water providers (except for small water vendors and carriers) require huge set up cost. • Because water will always be in demand and provides regular income, they are willing to invest large capital to set up and also require working capital to maintain the trucks.

2.9 Generating demand for improved sanitation

Although on-site sanitation options such as latrines are known to offer substantial health benefits and are often the most affordable and appropriate solution for sanitation in low-income communities, large-scale interventions for on-site sanitation have on the whole been disappointing with some notable exceptions. This has been attributed to the lack of demand for sanitation and the use of ineffective promotion approaches (Jenkins and Scott 2000; Obika, et al 2005 and 2003; Cairncross, 1992; Sanitation Connection, 2001; UNICEF and World Health Organization, 2000; DFID, 1998). The demand for sanitation, unlike water supply, needs to be stimulated.

The need for convenient and safe water supply is self evident to people, particularly the poor, when they calculate the cost in time, effort, distance and money spent to collect unsafe water. It is therefore not hard to generate 'demand for water supply', as the lack of demand for water supply is uncommon amongst the poor and everyone in general. The main challenge for water supply includes development of appropriate institutions; economic and financial arrangements are often dealt with through collective efforts of the government, private sector, NGOs, community or the civil society.

On the contrary, the demand for sanitation is often low, as people especially the poor often have cheaper alternatives such as the field (in rural and some peri urban areas), drainage channels, abandoned buildings, 'wrap and throw', rivers, etc. (in the urban areas). The reason being that unlike water supply, sanitation for the poor is handled (installation, maintenance, storage and final disposal) by individual families and small independent providers as against the collective effort used for water supply (Collingnon and Vézina 2000). In urban areas where sewerage technology similar to piped water supply is used, the poor hardly get serviced and are forced to provide their own individual latrines. For this reason, on-plot sanitation which is usually promoted in the rural areas, is very common in urban poor communities therefore requiring a different promotion approach to stimulate the demand for improved sanitation amongst low-income urban communities.

This section will review various techniques that are used for sanitation promotion with particular emphasis on marketing sanitation, suggested to be the most appropriate for stimulating demand in urban areas.

2.9.1 Approaches used for rural sanitation promotion

Traditional approaches

The various traditional approaches described below have not been successful in increasing the demand for sanitation on a large scale.

- *Health education:* A common practice in the past has been to include sanitation messages in the general health education messages. As part of health education, people were told what they should do (e.g. use a latrine) to improve their health. The approach assumes that people do not know anything about what causes diseases and should therefore be told what to do. This traditional approach has been criticised on the basis that people are not clean slates or empty vessels for health workers to fill.
- *Inducement:* In this approach, users are persuaded and induced to build and use improved sanitation facilities. This is often done by building a demonstration toilet and then conducting public health education offering people incentives. According to Cairncross (1992), the incentives often come in the form of *subsidies* for latrine construction. Other forms of inducement that have been used to promote sanitation include linking sanitation to water supply, where communities are required to build a certain number of household latrines before they can qualify for subsidised water supply. This approach is commonly used by NGOs who offer between 50 –100% subsidies to households towards latrine construction. In places where this method was used, latrines were often found unused or used for storage, as there was no real demand for sanitation but for water supply, and sanitation was a compulsory route for getting what they wanted. None of these inducement methods provides a lasting solution and was often difficult to implement on a larger scale.

- *Compulsion:* This method is often used by government agencies and municipalities where legislation and bye-laws are set making it compulsory for everyone to build latrines. This is similar to the approach used by the colonial regimes in Africa. In the rural and peri-urban areas, health inspectors had the responsibility of inspecting homes and fining those without latrines. In more recent times, the approach has been modified and sanitation has been made a compulsory part of building regulations. This means that any building plans without a toilet will not be approved by the relevant government authority. This approach has not been effective in low-income urban communities because they are often located in informal unplanned settlements where houses are constructed without plans and therefore no permission is sought.

Participatory approaches

- *Hygiene promotion:* In the mid – late 1990s, there were more criticisms of hygiene education programmes that still focus on increasing people's knowledge, on the assumption that people will change their unhygienic practices when they get information (UNICEF, 1999a, UNICEF, 1999b). Some authors suggested that hygiene education will be more effective in influencing behaviour change if people fully understand how diseases can be transmitted from excreta through various routes including water supply. This saw the birth of the '*F diagram*', which became popular for sanitation and hygiene promotion. (van Wijk and Murre, 1994). This approach meant that people participated in discussing how diseases may be transmitted in their community using the F-diagram. The feasibility of getting the urban poor residents (daily income earners) to sit for hours in discussion instead of searching for a job to earn their daily income is questionable.
- *PHAST:* As the use of participatory approaches became more popular, it became obvious that specific methodologies were needed for various aspects of hygiene practices, particularly sanitation. Some of the methodologies introduced include *PHAST (Participatory Hygiene and Sanitation Transformation)*. The PHAST approach has seven steps, and is aimed at assisting community members, particularly in the rural areas, to analyse their sanitation and hygiene problems and develop action plans

towards resolving the problems. One major criticism of PHAST is the long process it takes to go through the steps, which involves participation of households at great lengths. This may be possible in rural communities but on the contrary may be more difficult to apply in urban areas, particularly in low-income urban communities where people are continuously busy trying to secure basic everyday needs including housing, water, food, employment, etc.

2.9.2 Approaches for urban sanitation promotion

The relatively poor uptake of sanitation facilities among poor urban residents in the South has highlighted the need for new strategies for promoting latrines. Various attempts made in the past to increase demand for sanitation have yielded little result, making it necessary to look for alternatives. Sector practitioners are pushing towards a more demand-driven approach to sanitation provision. WELL (1998) indicated that traditional programmes tend to focus quantitatively on the number of latrines constructed or number of people with access, rather than taking time to understand users and the reasons behind adoption or rejection. It suggested sanitation marketing as an approach for promoting improved sanitation in urban areas being that it is demand led and uses a strategic, managed process of assessing and creating demand, and responding to felt needs.

Sanitation marketing

Sanitation marketing uses elements of commercial marketing to encourage as well as promote an activity that benefits both society and individuals. It is a process that comprises identifying key target groups to be reached, identifying core messages to be communicated, and gaining awareness of the prevailing socio-cultural framework and understanding what motivates people to invest (WSP, 2000b, McKenzie-Mohr, 2000, Hastings and Haywood, 1991, Lefebvre and Flora, 1988, Maibach, 1993, Goldberg, 1995, Kotler and Roberto, 1989). Several authors have advocated for the use of sanitation marketing to sell people what they want rather than what is good for them (Curtis, 2002).

Sanitation marketing has the advantage over other methods in that it tries to find out what motivates people to acquire improved latrines and work towards providing services to satisfy people's preferences. The result of a study conducted in a small urban centre in Ghana, suggested that the *drivers* for acquiring improved sanitation facilities include no smell/ventilation; opportunity to sit while using toilets (comfort and convenience); safe for children; being a good father/husband; status and prestige, etc. (Obika et al., 2003). A similar study conducted in the low-income settlements in Dar es Salaam, Tanzania investigated the motivations and constraints for acquiring sanitation by households. The study found that house owners are motivated to acquire improved sanitation because of personal benefit such as ensuring that the children have a good latrine, avoiding quarrels with neighbours by using their latrines, and avoiding the inconvenience and embarrassment of queuing to use another neighbour's latrine (Obika et al., 2005).

A more recent study in Ghana compared motivating and constraining factors at each adoption stage (Jenkins and Scott, 2007). The authors developed 'three progressive stages of the decision to adopt a sanitation change; preference, intention and choice'. Households in the preference stage are motivated to change because of dissatisfaction with their existing sanitation facilities. In the study the authors found that the most common reasons given by households for installing a latrine are for sick or old relatives, safety at night, convenience and easier cleaning.

The barriers to the adoption of improved sanitation have also been studied by various authors. The study by Obika, et al (2003) suggests that some of the barriers to acquiring latrines in low-income urban communities include limited technology options that satisfies user preferences, operation and performance of existing low-cost options, space, and lack of credit facilities. In Dar es Salaam, the constraints to acquiring improved sanitation include emptying difficulties, perceived high cost of 'good' latrine, lack of space, unstable soil conditions and high water table, poor skills of SIPS and the lack of reliable information (Obika et al., 2005). The study by Jenkins and Scott (2007) also cited limited space, high cost, SIP skills, competing priorities and credit issues as the constraints to acquiring sanitation facilities in Ghana.

Table 5: Sanitation marketing process

Stage	Activity
Planning	<ul style="list-style-type: none">• Formative research• Analysis• Audience segmentation• Strategy development
Message and materials development	<ul style="list-style-type: none">• Identifying appropriate channels• Developing effective messages• Producing creative execution
Pre-testing	<ul style="list-style-type: none">• Conducting the pre-test• Using the pre-test results
Implementation	<ul style="list-style-type: none">• Developing and implementing plans• Planning and buying media• Generating publicity• Monitoring implementation
Evaluation and feedback	<ul style="list-style-type: none">• Evaluation design• Evaluation methods• Using feedback to improve the programme

Understanding the motivations and constraints to acquiring improved sanitation is the foundation to sanitation marketing. It builds on these findings to identify appropriate latrine technologies to suit various income levels, develops appropriate messages for marketing and explains where customers can find information and buy the desired sanitation service.

Sanitation marketing involves obtaining information from consumers and using that information to modify products and concepts that are fed back to the same target audience through messages and packaging or positioning (McKee, 2000). The definition of stages of sanitation marketing in table 5 is based on the social marketing process as described by Weinreich (1999).

There are various case studies of successfully using the marketing approach to increase the demand and uptake of improved sanitation. An example is the project in Benin that led to the acquisition of 600 family latrines without subsidy (Reiff and Clegbaza, 1999). More recently, sanitation marketing has been successfully implemented in several countries including India, Indonesia, Tanzania, Ethiopia and Cambodia. However, the requirements for sanitation marketing are way beyond the capacity of SIPS and would require partnerships

between the public, private, community and possibly donor agencies. Sanitation marketing may have proved to be effective for generating demand for improved services in low-income urban settlements; it is not feasible to expect SIPS to also take on this responsibility.

2.10 Enabling environment for SIPS

Enabling environment is a broad term that is commonly used in the sector and can consist of different issues. Generally it includes public policies but in this thesis, it goes beyond policies and consists of infrastructural and other supports to support sustainable sanitation delivery. Enabling environment in this thesis refers to all the necessary external support required to sustain the delivery of sanitation services by SIPS in low-income urban communities. These include emptying and sludge disposal support, development and introduction of appropriate sanitation technologies, development and enforcement of policy and regulatory framework and support with generating demand for improved sanitation. Unfortunately, not much literature exists on the enabling environment for SIPS. The review in this section has therefore focused on sanitation policies, which is an area that had some literature.

In many countries of the world, sanitation policies have been non-existent and where they exist are thinly spread across several other sectors such as health and water supply making them unclear and contradictory. Generally, national level sanitation policies, except in few instances have been inadequate for programming and implementing sanitation by the national, regional or district government, and by the NGOs and private sector.

- Sanitation policies are important for clarifying roles and responsibilities of the various sector players in the provision of sanitation services. This is a problem in many countries where various agencies play duplicating roles in the provision of sanitation services.
- Sanitation policies facilitate the mobilisation, co-ordination and allocation of appropriate funds for the provision of sanitation services.

- Good sanitation policies provide the enabling environment for more sustainable and effective programmes. When policies are accepted by sector players and are reinforced, this enables effective programming and implementation of sanitation.

A good sanitation policy provides the guideline for a uniform approach to implementation by all sector players, NGOs, Government Agencies, and the private sector. Clarity is given on issues such as tariffs, subsidies, information and promotion programmes, and can form the basis for regulating the activities of SIPS.

Many sector practitioners including Governments and external funding agencies are beginning to realise the importance of sanitation policies. Unfortunately, many of the national policies that were donor driven have failed to achieve the results for which they were developed. The policy is often not widely accepted, resulting in respective government agencies developing individual sanitation strategies without any links to the policy, as is the case in Ghana. Sanitation policies are important for creating the conditions in which sanitation services can be improved by providing the basis for translating needs into action.

The importance of having a functional public policy and regulatory framework for sanitation that clarifies the roles and guidelines for small independent providers of sanitation cannot be overemphasised. Many authors have indicated that the lack of public policy framework is one of the major constraints facing small independent providers of water supply and sanitation. Collingnon and Vézina (2000) in their review of independent water and sanitation providers in cities of ten African countries pointed out that the main constraints are institutional and legal issues which they say stem from the lack of an appropriate public policy framework.

Another author argues that the regulatory and public policy environment only becomes a constraint when SIPS reach the stage of scaling up but as long as they remain small, they will not be affected by the policy environment (Snell, 1998). The same author also pointed out that the lack of policy can be a

constraint to SIPS and gave an example of Mali where sludge treatment plants want to see the development and enforcement of environmental health policy. A second case study that shows the impact of a clear policy maximising the role of SIPS is Dagupan City where the council had to first develop and implement the rule of prohibiting open urination and defecation which led to a privately managed public toilet facility becoming effectively operational.

The lack of appropriate public policy framework in many countries in sub-Saharan Africa means that SIPS are not officially recognised and are therefore not regulated and in some instances they are prosecuted. Unlike their water supply counterparts, the lack of dialogue between SIPS and public authority is even stronger. The only group of SIPS that have some form of contact with the public authority are the large suction truck operators because they require government facilities for sludge disposal. Even with such facilities, in many instances these groups are not officially recognised and have no independent regulatory body. An effective emptying and disposal system is a key component of sustainable sanitation in low-income urban settlements. Unfortunately, it will be impossible to establish these systems unless SIPS are recognised, regulated and supported to upscale their important role in sanitation provision.

Only a few if any at all of the existing sanitation policies have a separate section on the private sector (including SIPS) roles and operational guidelines. Maybe what is needed is a separate independent regulatory body for sanitation (excreta management), as lumping it with water supply has not always been very successful. The few countries in sub-Saharan Africa that have independent water and sanitation regulatory bodies often focus more on water supply. It is also possible that the small nature of SIPS makes it difficult if not almost impossible to regulate them. A more practical approach could be to persuade SIPS to form groups making them semi-formal and then the government can go into partnerships with them.

A good case study, even if not perfect, is in 'Bairro de Urbanização' where the local authority formed a partnership with 'ADABSU', a small association of SIPS that mainly provide emptying services to the low-income settlement near the

airport in Maputo Mozambique (Author's personal interview, 2008). ADABSU's pit emptying system includes the use of a small suction truck (vacutug) and the storage of sludge in surface plastic tanks in their office grounds. As part of the partnership agreements, the local authority should send its large mechanical suction truck to empty sludge from the storage tanks. Although the arrangements don't always work perfectly because the local authority fails to keep their part of the agreement, it is a good start and can be improved to work better. The government recognition of ADABSU has also enabled them to expand their services to the wider environment sanitation including winning a government contract for refuse collection, and drain construction and maintenance.

In general, there is very little information on experiences of creating an enabling environment particularly for SIPS. Without government creating the enabling environment, it will be almost impossible for SIPS to upscale their activities beyond what is obtainable currently. Unlike small-scale water supply providers that can scale up otherwise, SIPS require the enabling environment support not only for emptying and disposal but also in other areas such as technology and demand generation. The components of the policy framework that need to be considered by public authority include formal recognition and engagement of SIPS, simplifying the requirements for formalisation and contracting and franchising SIPS. Finally more research is needed on the activities of SIPS to inform the development of an appropriate policy and regulatory framework.

2.11 Information gaps in the literature

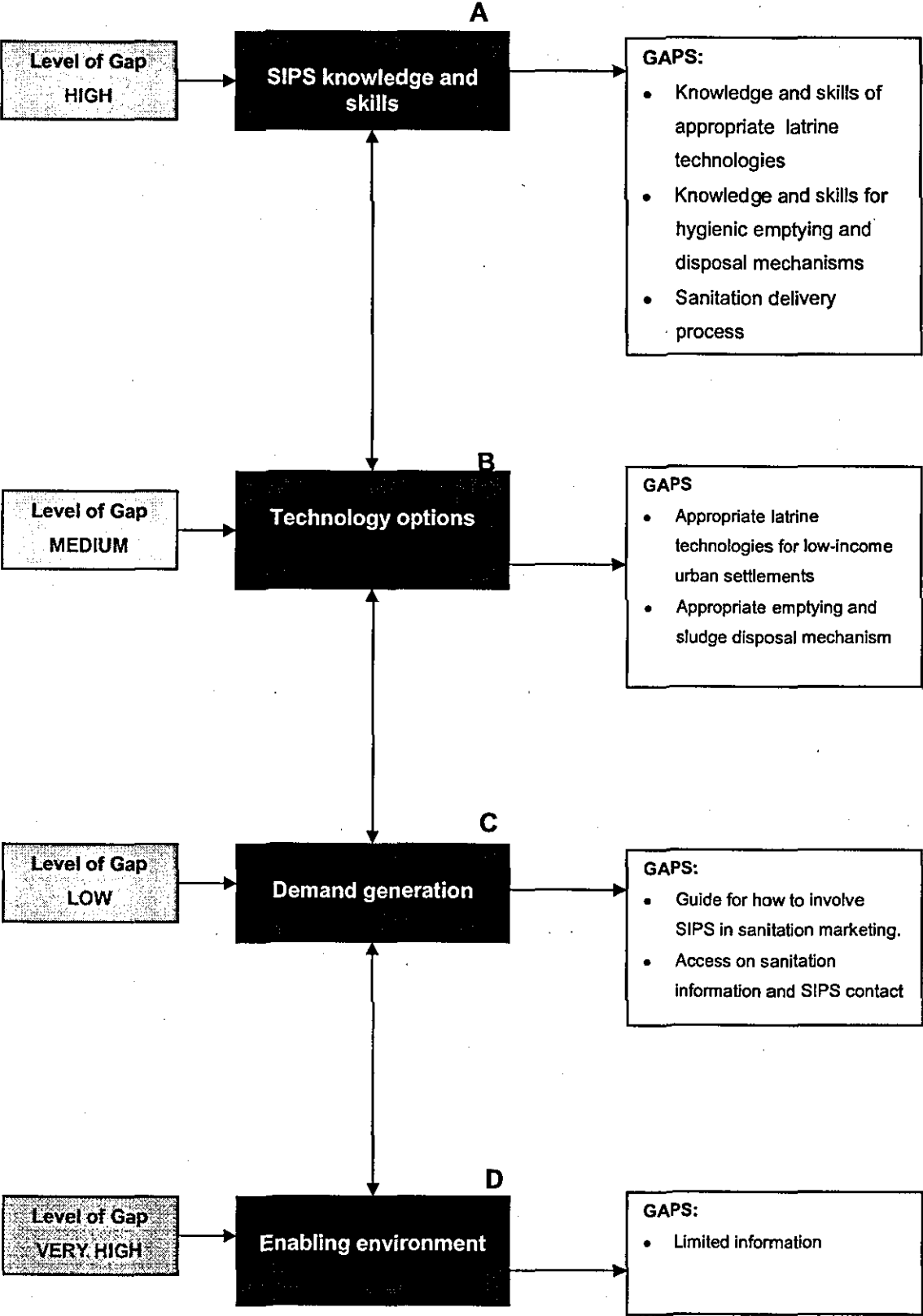
The literature review has further reinforced the important role of small independent providers of sanitation (SIPS) in upscaling access to improved sanitation in low-income urban communities. The capacity of SIPS to play this major role is dependent on the following; availability of appropriate technologies, their knowledge and skills, demand for improved sanitation and creating an enabling environment. A visual framework that summarises these key factors and the information gaps is shown in fig 2 below. The level of gaps are categorised as '*very high*' where there is little or no information; '*high*' where there is some information; '*medium*' where there is a fairly large amount of information; '*low*' where there is a lot of information.

- *SIPS knowledge and skills*: It is common knowledge and now widely accepted that SIPS play a key role in sanitation provision in low-income urban settlements. However, there is limited information on the details of their activities and their capacity to actually respond to the potentially increasing demand for urban sanitation. So far, there has been no literature that analyses the SIPS knowledge and skills for sanitation. The little existing information is from deductions based on the existing services provided by SIPS. The gap in information regarding SIPS knowledge and skills for improved sanitation is surprising considering the expectations within the sector that they are the future to improving sanitation for the urban poor.
- *Technology*: The issue of appropriate sanitation technology for urban poor settlements is an ongoing discussion amongst sector practitioners and utilities. The review indicated that the nature of these settlements makes it challenging to identify appropriate technologies for latrines and emptying mechanisms. On-plot options, which were considered appropriate, may no longer be suitable because of the space requirement and emptying difficulties, conventional sewerage network is too expensive to be considered and even the simplified sewerage suggested by Mara (2005) has its own complexity. However, there is a lot of information, discussion and suggestions regarding appropriate technology in numerous literature. The

gap in information is on technology options that take into account the escalating urban population and the current difficulties with the existing technologies.

- *Demand generation:* In the past there was limited information on what drives the demand for sanitation. Over the past few years with the focus shifting from health and hygiene education to responding to user demand, efforts have been made to study demand for sanitation and identify what are the motivations and constraints to acquiring improved sanitation. Promotion approaches such as sanitation marketing, which is based on user demand have proved successful for increasing uptake of improved sanitation. The review shows that there is information and evidence regarding effective approaches for generating the demand for improved sanitation.
- *Enabling environment for SIPS:* The need for creating and/or enhancing the enabling environment for SIPS cannot be over emphasised. Unlike small-scale providers of water supply, the review did not find much information on creating an enabling environment particularly for SIPS.

Figure 3. Information gaps on factors for SIPS success



2.12 Summary

The literature review provides detailed insight into the role and constraints of small independent providers of sanitation. Over 90% of the urban poor rely on small independent providers of sanitation for their sanitation. Although the sanitary conditions of the majority of the low-income urban settlements can be classified as 'unimproved', to put it in subtle manner, imagine what the situation would be without the SIPS. The obvious importance of SIPS for urban poor sanitation notwithstanding, very little academic or institutional research has been done to understand how they operate, their strengths and constraints, and how to build their capacity and create an enabling environment to upscale the quality and quantity of their services.

However, the literature review indicates that few publications have covered small independent providers of sanitation and their actual capacity to upscale the delivery of improved sanitation. In particular no substantive information was found in the following areas:

- *Sanitation delivery skills:* These include their knowledge of appropriate latrine technologies and mechanism for hygienic and effective emptying and disposal of sludge.
- *Latrine technology:* Not much publication on appropriate alternative latrine technologies for high density low-income urban settlements.
- *Demand generation:* A fair amount of information exists on understanding demand drivers for sanitation but not on how to involve SIPS or how to create access to information for users.
- *Enabling environment:* This is the most important factor for SIPS success and yet the area with least publication.

These gaps in knowledge and experiences were used as the basis for defining the research question in the next chapter 3. The thesis helps to fill the gaps in information in relation to SIPS knowledge and skills and the enabling environment for SIPS, and to a lesser extent, demand generation and latrine technology options.

Chapter 3: Research design and data collection methodology

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Chapter 3: Research design and data collection methodology

3.1 Chapter outline

This chapter explains the methodology adopted for the research. It outlines the hypothesis, research questions and units of analysis. The chapter also describes the data collection methods used for the research, the sources of data and the justification for the methodology adopted for the research.

3.2 Conceptual framework for the study

Over the next two decades, the majority of population growth in the developing countries will be in the urban areas with a greater percentage living in low-income settlements. The informal settlements in Africa currently account for an estimated 50 to 60% of the urban population. These settlements are already, and will become even more overcrowded with poor water supply and sanitation services thereby posing massive threats to urban health and even on a far larger scale (Black, 2001).

Historically, the task of providing sanitation services lies with the public sector, with the utilities having the direct responsibility (Allison, 2002). However, the conventional means of sanitation provision by utilities are not keeping pace with demand and often do not extend to the informal settlements. Governments and sector practitioners have difficulties providing water and sanitation services to the low-income urban settlements and this will become even worse with the escalating urban population in sub-Saharan Africa. Providing services, particularly appropriate and affordable sanitation, presents a number of critical challenges. The uncontrolled development and overcrowding present physical challenges for suitable technologies. Other challenges include the uncertainty of land tenure and the high proportion of tenant and migrant dwellers with short term rental in houses with absentee landlords. All these challenges make it difficult to employ conventional systems of delivering sanitation services (Cross and Morel, 2005).

In the meantime while the debate is ongoing, the gaps left by the public sector's poor or non-existent services to the informal urban settlements are filled by small-scale independent providers. The majority of the households in low-income urban settlements acquire their water supply and sanitation services from these small-scale providers. Various authors have indicated that the provision of sanitation services to the low-income urban areas can be significantly improved by working with the small-scale providers (Bongi and Morel, 2005, Cairncross, 1999, Cross and Morel, 2005, Obika et al., 2003). These small-scale independent providers, referred to in this thesis as small independent providers of sanitation (SIPS), often operate with skills acquired outside of school and without regulation or support from the government.

The assumption amongst sector practitioners is that SIPS are capable of up scaling the provision of improved latrines. However, not much is known about the actual capacity of SIPS who, unlike their water supply counterparts, have not been studied in-depth. There are good experiences of utilities working with small scale water providers but not much has been documented about SIPS. The study sets out to look at the activities of SIPS, their strengths and weaknesses and their ability to respond to the demand for improved sanitation in the face of the growing urban population.

The literature review in chapter 2 identified the current and future problems of sanitation particularly in peri-urban areas. The need and the urgency to improve sanitation provision in low-income urban settlements was highlighted. Existing evidence indicates that the majority of the sanitation in low-income settlements are paid for by the house owners and provided by small independent providers (SIPS) with almost no support from the municipality. There are very few known studies that focused specifically on SIPS and their capacity to deliver improved sanitation. In a study of ten African cities by Collingnon and Vézina (2002) identified institutional and legal factors that stems from the lack of appropriate public framework as the major obstacle to the expansion of services provided by independent water and sanitation providers. According to the authors, the indicators include the 'lack of communication with Authorities'; 'lack of

independent regulatory Authority'; and 'urban development policy vacuum' amongst others.

The findings from the literature regarding the activities of small-scale entrepreneurs in urban water supply and sanitation guided the research conceptual framework. A conceptual framework according to Miles and Huberman (1994) explains the major things to study either graphically or in a narrative form. It outlines the 'key factors, constructs or variables and the presumed relationships among them'.

The review supports the notion that majority of the households in low-income urban settlements acquire their sanitation services from small independent providers. However, there is a big gap in information on the knowledge, skills and experiences of SIPS and other external factors that impact directly on their ability to upscale the delivery of improved sanitation. The conceptual framework for the research was developed based on the few existing literature and the authors experiences on factors that can enhance the capacity of SIPS to deliver improved sanitation at scale. Horton et al (2003) defined capacity as the ability of independents and organisations to perform their tasks effectively and efficiently in a sustainable manner.

Capacity of SIPS to upscale the delivery of improved sanitation for the purpose of this thesis is defined as their ability to install and support sustainability of sanitation facilities that ensure the hygienic separation of human faeces from human contact. Various publications on capacity development identified three important areas to target as *organisational level, individual level and the enabling environment* (Baser, 2000; van de Meene, et al 2009). A similar report by Coates, et al (2005) on capacity assessment and development of rural water supply and sanitation institutions in Nigeria outlined key elements of capacity as *knowledge, skills and experiences; attitude and motivation; and the enabling environment*. The tools they used for conducting capacity assessment was based on the SWOT analysis framework, which has also been adapted for this research. The majority of these elements are applicable to SIPS and has been adapted to suit the nature of SIPS operations - they are independent rather than

being part of an organisation. The capacity assessment framework used in this research is therefore based on the above literature.

The capacity of small independent providers (SIPS) to upscale and accelerate the delivery of household sanitation is not solely dependent on their individual skills, knowledge or experiences but by other aspects of their internal and external environment. The internal environment is to do with the nature and level of household demand for sanitation and attitude to SIPS. The external environment also referred to as the enabling environment is related to sanitation policies and bye-laws; regulatory framework for informal sector participation in sanitation provision and government infrastructural required to support overall 'down stream' sanitation management. The conceptual framework (figure 4) outlines the key elements for assessing the capacity of SIPs to upscale the delivery of improved sanitation.

3.2.1 Key elements of the conceptual framework

A. Internal environment:

- *Individual SIP latrine delivery skills:*

In order for SIPS to be able to deliver improved sanitation at scale, they need to have the necessary knowledge of latrine technologies and options including their operations, maintenance, suitability, advantages and disadvantages. This is to enable them to provide house owners with the appropriate information to enable them to make decision about their sanitation choices. Another important aspects is the SIPS skills and experiences of delivering sanitation services. These include their advisory and costing skills; construction skills; emptying and disposal skills; customer relation and marketing skills. This is usually the focus of SIPS capacity building projects and often consist of training. Assessing SIPS latrine building skills forms a key component of the research question, and addresses the gap in the existing literature.

- *Sanitation demand*

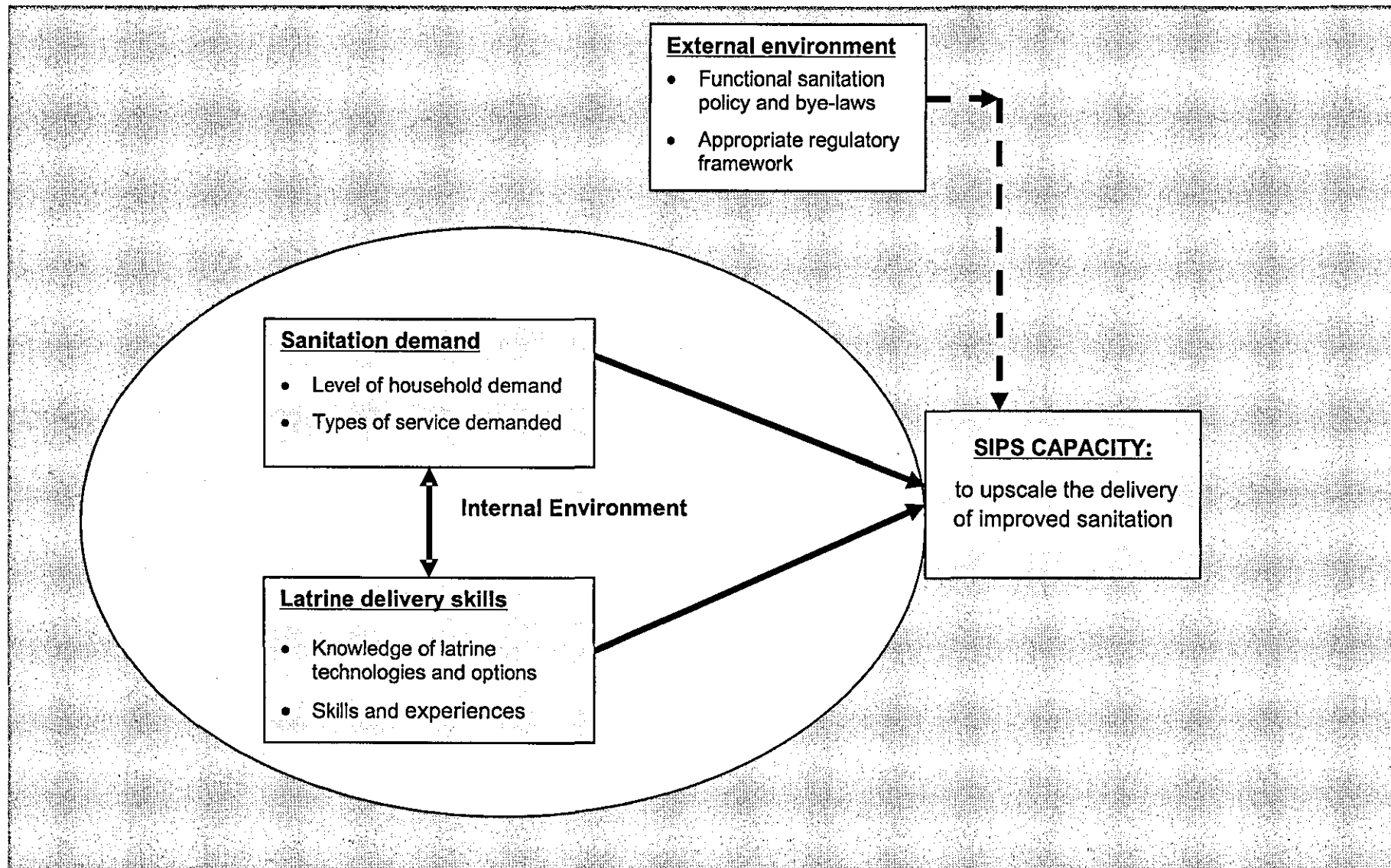
Demand for sanitation is a key component of increasing sanitation coverage. The level and nature of sanitation demand plays has an impacts on SIPS

capacity to upscale the delivery of improved sanitation. As the level and nature of demand increases, SIPS are forced to make innovations to respond to the various demand. If the demand is low, there is little motivation for SIPS to exert themselves and often focus on other manual labour to earn their income. The conditions of the majority of the low-income urban settlements requires special innovation for sanitation delivery, SIPS often struggle, as they are ill equipped to deal with such complex conditions independently. The research looks into elements of sanitation demand.

B. External environment

External environment widely referred to as the enabling environment is a key component of any capacity assessment and development programme. Although SIPS are independent, they operate within a wider environment which 'enable' or 'constrain' their ability to upscale the delivery of improved sanitation. Aspects of the enabling environment that can impact on SIPS capacity include sanitation policies and bye-laws, regulatory framework for informal sector participation in urban sanitation delivery, urban improvement policies and infrastructural support. Although it can be assumed that SIPS can continue to operate independently and that their capacity can be enhanced if their individual skills and demand is improved; the nature of sanitation delivery involves 'upstream' (installation) and 'downstream' (emptying and disposal) interventions and as such SIPS may never be in a position deliver both upstream and downstream sanitation services independently. The research endeavoured to fill the gap in literature in relation to the enabling environment to enhanced SIPS performance.

Figure 4. Conceptual framework of the research



3.3 Research objectives

This research is aimed at assessing the capacity of small independent providers of sanitation (SIPS) to upscale the delivery of improved sanitation. These include; examining their level of knowledge and awareness of household sanitation technologies, and their skills and experiences of installing and emptying sanitation facilities in low-income urban settlements. This research not only assesses the capacity of small independent providers of sanitation but also compares their perspective with that of households, while at the same looking in detail at the entire process of delivering and acquiring a household latrine or emptying services.

This research is intended to facilitate the decision-making process for government, non-government and international organisations and those planning for scaling up and accelerating access to improved sanitation in urban areas. The research seeks to examine the capacity of small independent providers to upscale the delivery of improved sanitation in low-income urban settlements in response to household preferences and demands.

The researcher is aware of other factors that have been mentioned as reasons for the slow increase in sanitation coverage in Africa, including political will, institutional setups, funding and policy issues. However, it is not the intention of this research to go into details of these other important issues but to concentrate on a key aspect that can operate independently without much impact from the external issues listed earlier. The main focus of the research is to investigate factors related to the delivery of sanitation services that are highly important for upscaling and accelerating the demand and uptake of latrines in low-income urban areas. The research constitutes a wide range of issues including socio-cultural, political, financial, technical and institutional factors.

It is important to note that this research focuses mainly on the capacity of small independent providers to deliver improved household sanitation. Evidence shows that the majority of existing household sanitation facilities in low-income urban settlements are provided by small independent persons paid for by the

house owners. Recently, there has been increasing recognition and suggestion amongst sector practitioners that small independent providers are major players in upscaling and accelerating access to improved sanitation. There is a serious information gap in the capacity of these providers to achieve the expectations. Thus this research will examine the skills, knowledge, and experiences of small independent providers and compare these to household knowledge, preferences, demand and experiences with sanitation delivery. The research objective is therefore to assess the capacity of small independent providers to upscale the delivery of improved sanitation.

3.4 Hypothesis

The hypothesis for this research is:

Small independent providers have the capacity to deliver improved sanitation services and are significant actors in scaling up and accelerating sanitation coverage.

3.5 Research questions

Defining research questions is one of the most important steps in a research study, as it will help to determine the research design (Yin 2003). The literature review on the reasons for low coverage levels for sanitation points mainly to the lack of demand by households. There are gaps in the information regarding the capacity of small scale providers to upscale and accelerate the delivery of household sanitation. Multiple research questions have therefore been identified to help fill these gaps and have been grouped into primary and secondary study questions. This will help researchers and planners to have a better understanding of SIPS and devise sustainable ways of involving them in sanitation provision.

The primary research question is as follows,

Do small independent providers have the capacity to upscale and accelerate the delivery of improved sanitation at a scale necessary to close the gap in coverage?

The secondary research questions related to the primary questions have been formulated as follows:

- *What level of knowledge do small independent sanitation providers possess?* Objective: To assess small independent providers' knowledge of improved sanitation options, emptying and disposal services.
- *What skills do SIPS possess and what are their experiences of delivering sanitation services to households?* Objective: To assess and examine the skills and experiences of small independent providers in relation to the installing and emptying of latrines.
- *How do small independent providers deliver sanitation services?* Objective: To gain understanding of the process of delivering sanitation services to households.
- *What is the nature of house owners' knowledge and preferences for sanitation?* Objective: To assess household knowledge and preference for latrine options and emptying services.
- *What are house owners' experiences of acquiring sanitation services from small independent providers?* Objective: To examine household experiences of latrine installation and emptying by small independent providers.

3.6 Research design

According to Yin 2003, a research design is 'the logic that links the data to be collected (and the conclusions to be drawn) to the initial research questions'. He emphasised that a research design is a logical plan for getting from *here (initial research questions)* to *there (set of conclusions)* and between here and there are a number of major steps, which include data collection and analysis. Nachmias & Nachmias (1992) described research design as a plan that directs the researcher in the process of collecting, analysing, and interpreting observations.

The design for this research follows the five particularly important components as suggested by Yin (2003). They include,

i. **Research question/s:**

Do small independent providers have the capacity to upscale and accelerate the delivery of improved sanitation at a scale necessary to close the gap in coverage?

ii. **Research hypothesis:**

Small independent providers have the capacity to deliver improved sanitation services and are significant actors in scaling up and accelerating sanitation coverage.

iii. **Units of analysis:**

The units of analysis for this research are small independent sanitation providers and house owners in low-income urban settlements.

iv. **Logic linking the data to the hypothesis:** This is the way in which the data collected is linked to the hypothesis. It guides data collection and analysis and provides patterns for matching results with the hypothesis. This approach has been defined as 'pattern matching' by Campbell (1975).

v. **Criteria for interpreting the findings:** This explains how the data collected can be analysed to provide possible answers to the research question.

In social science research, the strategies that can be used include *case study, experiments, surveys, histories, and the analysis of archival information*. The choice of which to use according to Yin (2003), depends on three factors:

- The type of research questions
- The control an investigator has over actual behavioural events
- The focus on contemporary as opposed to historical phenomena

Table 6: Relevant situations for different research strategies			
<i>Method</i>	<i>Form of research question</i>	<i>Requires control of behavioural events?</i>	<i>Focuses on contemporary events?</i>
Experiment	How, why?	Yes	Yes
Survey	Who, what, where, how many, how much?	No	Yes
Archival analysis	Who, what, where, how many, how much?	No	Yes/No
History	How, why?	No	No
Case study	How, why?	No	Yes

Source: COSMOS Corporation in (Yin 2003)

This research has adopted the strategy proposed by Yin for deciding the design for the study. Considering that the majority of the research questions for this work can be categorised as “what” and “how”, when compared with the guide in table 3.1 all research methods are applicable. However, the delivery of household sanitation in low-income urban settlements is a contemporary event rather than a historical event, making historical analysis an unsuitable research strategy. It is also not possible to control behavioural events in relation to household sanitation, therefore experiment is not suitable. Considering that the ‘what’ research questions are more exploratory rather than ‘how many’ or ‘how much’ line of enquiry, exploratory case study and survey were deemed the most suitable.

3.6.1 Measuring the quality of research design

A good research design should represent a logical set of statements, and the quality of any empirical social research can be judged using *validity* and *reliability* tests.

Validity is a measure of the extent to which the data collected is a true picture of what is studied. The three main types of validity commonly used in social research are, *construct validity*, *internal validity*, and *external validity*. The definitions of the three types of validity are given by Judd and Smith (1991) as:

- **Construct validity:** it is a measure of the extent to which the constructs of the theoretical framework are successfully operationalised in the research.
- **Internal validity:** it is the extent to which causal conclusion can be drawn about the effect of one variable on another.
- **External validity:** it is the extent to which generalisations can be made from the research sample and setting to a wider population and setting.

Although all the types of validity mentioned above are important in evaluating research design, the level of importance depends on the purpose that the research is designed to serve. For a research whose purpose is primarily to discover the cause of a particular behaviour, it may be initially sufficient to measure other constructs that are related to the behaviour of interest rather than the causal relationships. In this type of research, construct validity is more important than internal validity. In another research whose main purpose is replication, the main concern should be on the measure of external validity rather than construct or internal validity. This research is mainly concerned with operationalising the constructs of the theoretical interest and making generalisations based on the data collected. It therefore places more emphasis on maximising construct and external validity.

Reliability is the extent to which data collection methods can yield the same result when repeated by the same person or someone else.

To ensure the validity and reliability of the research, the following measures were adopted,

- Triangulation through use of different methods to collect the same information.
- Peer review of data collection tools
- Use of qualitative and quantitative research methods
- Data collection from multiple sources
- Use of a small group of field assistants

3.7 Sources of data and justification

Since the focus of the research is on assessing the capacity of small independent providers to upscale and accelerate the delivery of improved sanitation in response to household preferences and demand, primary information on the internal and external factors that impact on their ability are required.

The primary sources of information were mainly the small-scale providers and households in low-income urban settlements. Data were collected using *focus group discussions and questionnaire survey*.

Sources of data for the research can be described at three levels; *macro, meso and micro levels*. As the conceptual framework is built around assessing the capacity of SIPS to deliver improved sanitation in low-income urban settlements, it is important to demonstrate that the data sources chosen are able to provide answers to the research question in accordance with the suggestions by Yin (2004).

At the macro level, Tanzania was chosen for data collection based on the following reasons:

- Rapid urbanisation and high percentage of informal high-density settlements with a challenge for sanitation delivery,
- Good links with non-government organisations and government institutions involved in the delivery of household sanitation,

- Permits for analysis of the progress made by a group of small independent providers, whose capacities were enhanced to respond to potentially increased demand due to sanitation marketing.

At the meso-level, Dar es Salaam with a population size of 2.5million was selected mainly because of its urban population density and having the smallest land area amongst other regions on the Tanzania mainland. The rationale behind the choice also includes,

- A range of options for high-density low-income settlements within easy access.
- Opportunity to compare the performance of small-scale providers across various low-income urban settlements.
- Good links with NGOs working on sanitation in low-income settlements.
- Provides a case study of sanitation marketing and capacity building of small independent providers to upscale and accelerate access to improved sanitation in low-income settlements.

At the micro level, eight wards were selected from the three Districts in Dar es Salaam (Kinondoni, Ilala and Temeke Districts) in collaboration with the NGO assisting in the research (4). The criteria used for the selection include,

- High density low-income settlement.
- Mixture of informal and formal settlements under a recognised government institutional structure.
- A high percentage of houses with unimproved latrines.
- More than 80% of the existing household latrines installed by small-scale providers.

[illegible]

Figure 1. The effect of the number of trials on the number of correct responses. The number of correct responses was significantly higher than the number of incorrect responses in all cases. The number of correct responses was significantly higher than the number of incorrect responses in all cases. The number of correct responses was significantly higher than the number of incorrect responses in all cases.

Table 7: Description of study areas in Dar es Salaam, Tanzania		
District	Ward	Population
Kinondoni	Tandale	45,058
	Mwananyamala	44,531
	Manzese	66,866
Ilala	Mchikichini	19,463
	Vingunguti	68,923
	Buguruni	67,028
Temeke	Mtoni	47,952
	Keko	32,249

Source: 2002 Population and Housing Census General Report, Dar es Salaam 2003.

3.8 Data collection methods

The research used three key methods of data collection including *focus group discussion and questionnaire survey*. Direct observation was also used to complement the two research methods. The database summary is presented in table 12. As mentioned earlier in section 3.6.1, several measures were taken to ensure reliability and validity of the data collection process. These include the following:

- *Peer review of data collection tools:*

Peer review of focus group discussion guides (SIPS and households) was sought from colleagues in WEDC, Steadman (a social research agency that specialises in the use of focus groups for data collection), and staff of WaterAid Tanzania who work in the urban drinking water and sanitation programme. The focus group discussion guides were modified on the basis of feedback received. The guides were translated into Swahili and circulated for review to eminent Swahili teachers in the University of Dar es Salaam and to staff of Plan International working in water supply and sanitation projects. Further changes were made to incorporate the feedback. The final guides were pretested twice in 'dummy' focus group discussions. The extensive pretesting was to ensure that key information was not missed during translation from English to Swahili. The same procedures were followed for the questionnaire.

- *Triangulation methods:*

One of the key challenges of social research methods is how to minimise researcher or field investigators' and respondents' bias. In order to minimise such bias, the research used three types of triangulation. These include *data triangulation* through collecting data from more than one source. Data were not only collected from small independent latrine builders in one area but from sample areas in Dar es Salaam and also from households. Informal discussions were held with NGOs working in urban sanitation in Dar es Salaam on the contents of the transcripts and findings from focus groups discussions. A brief descriptions of the activities of the three NGOs are given below.

The second type of triangulation used is known as *investigators' triangulation*, where multiple field investigators were involved particularly for the quantitative research. Using this method, questionnaires from different investigators were crosschecked at the end of every day of fieldwork.

The second type, *methodical triangulation* involved the use of multiple research methods for data collection.

- *Use of qualitative and quantitative research methods:*

The research primarily used focus group discussion and questionnaire survey methods, and to a lesser extent informal observation of sanitation facilities. The use of multiple methods enabled information on the same issues to be collected from different sources.

- *Use of multiple field investigators:*

Data collection was initiated during the DFID-funded Knowledge and Research project on social marketing for urban sanitation in partnership with WaterAid's Urban Programme in Dar es Salaam and was mainly related to sanitation marketing. The bulk of the remaining data was collected after the end of the DFID social marketing KaR and is related to small scale providers of sanitation services. The researcher was supported by a team of six field assistants who were trained during the DFID KaR project to administer questionnaires. The researcher needed to use this team to ensure that appropriate information was

collected using the local language. A facilitator and a note taker trained by the researcher during the DFID KaR provided support during the focus group discussions.

- *Verbatim transcribing of focus groups:*

In order to ensure that no information from focus groups was missed, a trained note taker was present in all focus groups and all discussions were captured verbatim on tape. Every focus group was transcribed verbatim and crosschecked by an independent person to ensure that nothing was omitted by the transcribers.

3.8.1 Qualitative data collection

The bulk of the qualitative data was collected from two categories of focus groups, small independent providers of sanitation and households. To ensure that mainly house owners or decision makers participated in the focus groups, a recruitment questionnaire (appendix 1) consisting of predefined selection criteria was used. The participants consisted of house owners or decision makers with improved and unimproved latrines. Some groups consisted only of men or women while some of the groups were mixed. A group consisting of tenants in houses with non-resident owners was included in order to obtain a cross-sectional overview.

The majority of the small independent providers were identified during the focus group discussion with households. Others were identified through local and international NGOs that have worked with latrine builders and emptying services providers in the past.

3.8.1.1 Focus group discussion

Focus group discussion was chosen as an appropriate methodology for gathering detailed information regarding the activities SIPS and the process of acquiring sanitation in low-income urban settlements. When compared to other methods such as in-depth interview or groups interviews, focus groups allows for pre-selection of groups of interest to openly discuss amongst themselves without much interference from an outsider.

Two examples of projects to upscale access to improved sanitation in peri-urban areas that involved SIPS capacity building and demand generation were reviewed. SIPS that were involved in the two projects were included in two separate focus groups discussions. The two case studies provided an opportunity to compare the potential impact of enhancing the capacity of small independent providers.

The focus groups' design used for data collection was in line with the 'rules of thumb' described by Morgan (1997) and Krueger and Casey (2000), which suggests that there should be 3 – 5 groups per project, and 6 – 10 participants per group. In order to highlight the key issues from the focus groups, different categories of questions were developed based on the suggestions by Krueger and Casey. The categories include: *opening questions; introductory questions; transition questions; key questions; and ending questions*. The focus groups' guides were initially drafted by the researcher and then peer reviewed internally in WEDC.

Further brainstorming sessions were organised with field assistants from the collaborating organisation (WaterAid Dar es Salaam Urban Project) before the final guide was developed in English. The English versions were then translated into Swahili and were further peer reviewed by a staff member of the Department of Languages (Swahili) at the University of Dar es Salaam. Prior to using the guides in the field, they were pretested with the field assistants to ensure that the questions were clear and were the exact translation of the English version. Sample topic guides used for the focus group discussions are attached in appendix 2 and 3.

The focus group topic guides for small independent providers consisted of questions on their knowledge, skills, experiences, and delivery process, while the topic guide for households had questions on knowledge, experiences with various latrines and preferences of latrine options, and experiences of acquiring latrines from small independent providers, (see table 8).

Table 8: Summary of the content of focus group guides used for data collection

<i>Small Independent Providers (SIPS)</i>	<i>Household</i>
A. Knowledge and awareness of latrine technologies and options	A. Knowledge and exposure to household latrines
B. Skills and experience of building different types of latrine	B. Latrine use and maintenance experiences
C. Existing methods for pit latrine emptying	C. Dissatisfaction with the existing latrine
D. Skills and experience of emptying latrines	D. Motivations for building a latrine in the house
E. Household demand process for latrine	E. Attributes required and desired in a latrine
F. Process of delivering latrines to households	F. Experiences with the delivery of sanitation services by small independent providers

The focus group discussion guide questions were developed based on the key research questions and the conceptual framework. In the focus group discussions with SIPS, section 'A' is aimed at responding to research question 1 whilst sections 'B' to 'D' respond to research question 2. Section 'F' responds to research question 3 while section 'E' contributes to research question 4. In the focus groups with house owners, sections 'A' to 'F' answers research question 4 whilst section 'F' answers research question 5. The entire focus group guide covers the elements of capacity assessment described in the conceptual framework, which include knowledge, skills, experiences, demand and aspects of the external environment.

Focus group participants

There were two main categories of focus group participants, small independent sanitation providers and households.

Small independent providers of sanitation (latrine builders and emptying services providers) were identified through participants of the focus groups with house owners. Only small independent providers that have built or emptied latrines in the informal settlements in the past 6-10 months of the time of data collection were included in the focus groups. This is to ensure that masons who actually build latrines rather than those that build only houses, and occasionally latrines, participated in the focus group.

Small independent providers were of two categories, those that build latrines and those that provide emptying services. The SIPS were further divided into three sub categories as outlined in table 9. A total of nine focus groups were held with sanitation service providers including one with pit emptiers. The researcher planned to have more than one focus group with pit emptying service providers but the difficulty with singling them out from latrine builders meant that only one group could be organised. Most of the emptying services providers do not want to be singled out due to the social stigma attached of the job. It was observed that some of the latrine builders also provided emptying services, hence the inclusion of topics on pit emptying in the discussions with latrine builders.

Table 9: SIPS focus groups	
Group	Description
• Trained SIPS	Attended formal training organised by NGOs.
• Untrained SIPS	Have not had any formal training but learnt on the job from a family member, friends or acquaintances.
• Pit emptiers	Provides pit emptying services.

The focus groups consisting of house owners were in three sub-groups; those with improved latrines, those with unimproved latrines and those without latrines. In order to obtain in-depth information, participants of the focus groups with households (table 10) were identified using recruitment questionnaires, which contained pre-determined criteria (see appendix 1.2). Groups with only tenants with absentee landlords were also conducted. This is to ensure that appropriate participants were selected from cross-sections of the population. Each focus group consisted of 10 participants, as recommended by Krueger and Casey (2000).

Selection of participants

Two to three days prior to conducting a focus group discussion, a pre selection interviews were held to identify participants that fit a particular group criteria. During the interviews, the purpose of the discussion were clearly explained to

the participants and no promises of service provision were made. Ten persons that fit the criteria and were willing to participate were issued invitation letters to attend the focus group discussion sessions. In average, there were 10 participants in each group, although some groups were more, as some people attended without invitation. It was not difficult to get the participants to attend the focus groups, as the research had established previous relationship with them through WaterAid who were have been working in water supply and sanitation in these areas. The discussion also provided an opportunity for residents from various areas to exchange ideas and learn from each other. All focus group discussions were held in a meeting room of the Vocational Training Institute away from the settlements to avoid interruptions, which were witnessed during the dummy focus groups. As a result, the participants were provided with transport fare and lunch because they had to leave their areas to attend the discussion.

Recording and transcribing focus group discussions

Two note takers were trained to take notes during the focus group discussions. In order to reduce bias, the note takers were alternated between the various focus groups. Tape recorders were also used in all focus groups to ensure that no vital information was missed. At the end of every focus group, the researcher sat with the assistants to go through the discussion notes and the tapes were transcribed verbatim. The researcher also reviewed and discussed the transcribed transcripts with the assistants to ensure that no information was missed or misrepresented.

Table 10: Household focus group sub categories for data collection
<ul style="list-style-type: none"> ▪ Female house owners with unimproved latrines¹ and with/without tenants ▪ Male house owners with unimproved latrines and with/without tenants ▪ Mixed male/female owners with improved² latrines ▪ Mixed male/female tenants with absentee house owner and unimproved latrine ▪ House owners with no latrines and with/without tenants ▪ Tenants with non-resident owner with unimproved /no latrines.

¹ Unimproved latrines are full pit latrines lined with blocks or pit latrines lined with metal drums or used car tyres with temporary superstructure and are referred to as 'passport latrines' by the residents.

3.8.1.2 Direct observation

Direct observation was used to complement the other two data collection methods. During questionnaire administration, latrines in houses were observed to note technology type, materials and design of superstructure and any special features that have been added to the latrine. The house owners or caretakers were asked for attributes that they like best about the latrine and those that they would like to change if given the opportunity. Other questions asked included, age and cost of latrine; number of times it has been emptied; method and cost of emptying; disposal sites; and difficulties encountered with the use and maintenance of the latrine. Direct observation of latrine emptying process was also conducted where possible. This afforded the opportunity to further understand the pit emptying process and the difficulties experienced.

3.8.2 Quantitative data collection method

Quantitative data were collected through household questionnaires. Notes and supplementary information collected by field assistants during questionnaire administration were also summarised and formed part of the data. The original plan to also administer questionnaires to small independent providers was not feasible, as it was difficult to identify them in large numbers. Using focus group discussion yielded more in-depth information.

3.8.2.1 Questionnaire survey

Questionnaire surveys were used to elicit information from a wider sample of house owners. This built on information already collected through focus groups and was aimed at gathering more quantitative information from house owners related to:

- knowledge and experience of latrine use and emptying services;
- perceptions of the services of small independent providers;
- attributes desired in a latrine to motivate households to want to invest;
- Experiences of acquiring sanitation services from SIPS.

A sample questionnaire is attached in appendix 4.

² Improved latrines are pit latrines that are lined with bricks and have superstructures made of brick and sometimes installed with ceramic squatting pour-flush pans.

Due to the small population of small independent latrine builders and emptying service providers in low-income informal settlements, the researcher felt that focus group discussion would provide the more in-depth information required on the capacity of small independent providers.

Administration of house owners' questionnaire

All the questionnaires were administered directly from house to house with the assistance of enumerators. Due to the informal nature and density of houses in the study areas, it was not possible to use numbers to select sample houses for the survey. Instead, community maps made by the residents with the assistance of WaterAid and Plan International were used to divide each of the study areas into clusters. Questionnaires were administered to every tenth house in the various clusters. Where a house owner or his/her representative was absent, the enumerator noted this information and moved to the next house or until he found the right person to interview.

Enumerators who have extensive experience with administering questionnaire surveys and have worked with WaterAid and Steadman research agency were engaged to conduct the survey. Prior to administering the house-to-house survey, the team of 6 enumerators (3 males and 3 females) in conjunction with the researcher went through the English and Swahili version of the questionnaire. As they did not require further training due to their experience, the session was used to go through the questions one by one and clarify any unclear areas.

Each enumerator administered 5 questionnaires as pilot. On completion of the pilot exercise, the team got together with the researcher to go through the completed questionnaires. Final modifications were then made and unclear questions were clarified prior to commencing the full scale house-to-house survey. The researcher accompanied the team to all the study areas to supervise and ensure the reliability of the data collected.

Sampling

As it was not possible to get a complete list of residents of the informal settlements in the study areas, a stratified random sampling technique was used. Stratified sampling is where a population is divided into strata and samples are selected randomly from the respective strata. The strata are the subwards selected non-randomly from eight wards.

In Kinondoni and Temeke Municipalities, three wards were selected respectively and one subward from each of the wards. In Ilala municipality, two wards were selected and three subwards from each of the two wards. The selection was based on the nature of the settlements (informal), population and housing density, and established links with WaterAid and Plan International. To facilitate coordination and supervision of data collection, each of the subwards was divided into clusters. Enumerators were assigned to the respective clusters and questionnaires were administered randomly at every tenth house to house owners or their representatives.

The study tried to get a cross-sectional representation of informal settlements in Dar es Salaam within the limited resources. In order to obtain a representative sample, enumerators targeted both male and female-headed households and in particular house owners or caretakers. Although the results were not aimed at producing a statistically representative result, they provided a quantitative baseline data with which relations between the research variables and findings from the qualitative research could be compared.

Response

Four hundred and twenty seven (427) household questionnaires were completed as part of the quantitative survey. These included 168 in Ilala, 146 in Kinondoni and 113 in Temeke Districts respectively. Efforts that were made to reduce the errors in the questionnaire are explained below.

Coverage error: This refers to potential bias during sample selection. In order to reduce this, detailed discussions were held with research collaborators to

develop clear criteria. The sample Districts, wards and subwards were then selected based on how closely they fitted the criteria.

Response error is when respondents misunderstand the questions. In order to minimise response error, several discussions were held with enumerators to discuss each individual question and unclear questions were reworded. To further minimise potential errors with wording of the questions, dummy exercises were held amongst the team. In addition each enumerator administered at least 5 pilot questionnaires and further discussions were held after the pilot exercises.

Non-response error relates to the potential bias with the respondents in the selected sample and the inability or failure of respondents to answer particular questions. Discussions were held with research collaborators to minimise bias due to responding samples. The item non-response error was minimal due to the thorough training and rehearsals of the enumerators. The face-to-face administration of the questionnaires resulted in the low levels of item non-response errors.

Table 11: Summary of questionnaire responses by municipality			
Municipality	Ward	Subward	Responses
Ilala	Buguruni	Mnyamani	30
		Madenge	30
		Kisiwani	30
	Vingunguti	Mtakuja	19
		Kombo	29
		Mtanbani	30
Kinondoni	Tandali	Pakacha	40
	Manzese	Uzuri	59
	Mnyamala	Kupa	47
Temeke	Sandale	Mamboleo B	28
	Keko	Keko Mwanga B	45
	Mtoni	Mtoni	40
Total			427

3.9 Database summary

A considerable amount of qualitative and quantitative data related to capacity of SIPS and house owners was generated. It was not possible to include the bulk of the raw data in this thesis. However, the data have been synthesised and written up in the earlier and subsequent chapters. Table 12 below summarises the database that provided the source of information for writing the thesis.

Table 12: Summary of database	
Data collection method	Quantity
Focus group discussion (Small Independent Providers)	10 groups (100 participants)
Focus group discussion (Household)	11 groups (110 participants)
Questionnaire survey (Household)	427
Documents reviewed	184

3.10 Data analysis

All focus group discussions were transcribed verbatim from note takers notes and recorded tapes. The transcripts were analysed with ATLAS.ti 4.2 (software) designed to analyse qualitative data using codes and super codes to create queries and build networks and theories of relationship or association. The research questions were used as the basis for developing codes in ATLAS.ti software. Using the software, all transcripts were individually analysed and sentences or paragraphs known as quotations corresponding to the developed codes were highlighted.

Quantitative data were analysed with SPSS (software) version 12 and 15. Statistical analysis methods such as frequencies, percentages, chi-square (as a test of statistical significance) and Cramer's V (a test for strength of association) were applied to the data.

A detailed analysis is presented in chapter 4.

3.11 Chapter summary

This chapter describes the research design highlighting the objectives, research questions and units of analysis. In order to understand the various aspects of the issues being researched, a mixture of methods was used to collect information from the study population. These methods included a combination of qualitative methods (focus group discussions) and quantitative method (questionnaire survey).

To ensure the validity of data, triangulation using more than one method to collect similar information from different sources was utilised. The study also covered the 3 municipalities and 8 wards and 12 subwards in Dar es Salaam in order to obtain a cross sectional overview and increase the reliability of the study.

The original plans to administer questionnaire surveys to small independent latrine builders who service the low-income settlements were not feasible due to their limited numbers. It was also not possible to hold more than one separate group discussion with pit emptiers, as small groups of individuals did not want to be singled out due to the stigma associated with their work. Moreover, it was found that some latrine builders also doubled as emptying service providers. It is important to mention that this has not affected the outcome of the findings, as focus group discussions were used to elicit more in-depth information from small independent providers.

Chapter 4: Data analysis

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Chapter 4: Data analysis

4.1 Chapter outline

This chapter presents and examines the research findings and give details of the qualitative and quantitative data analysis. The objective of this chapter is to utilise data collected through focus groups discussions and household questionnaire surveys to answer the research questions. In order to present the findings in a more cohesive manner, this chapter has been divided into two parts.

Part A presents and analyses qualitative data collected through focus group discussions with small independent providers of sanitation (SIPS) and house owners. This is further divided into subsections, each presenting case histories and field insights in relation to the various research questions. Information relating to small independent providers of sanitation was collected using a qualitative method (focus group discussions).

Part A consists of five sections (4.2 – 4.6) and presents findings from small independent providers of sanitation and house owners. Extracts from transcripts of focus group discussions have been presented in boxes. Each section consists of a series of case histories responding to the respective research questions. The data have been presented in this way in order to demonstrate real field insight into the activities and capacity of small independent providers of sanitation services. The sections begin by highlighting the research question being addressed, followed by boxes containing case histories/ extracts from focus group transcripts and end with summaries of findings. The division of focus group data is shown in figure 6.

Part B presents the analysis of quantitative data collected through questionnaire surveys administered to house owners. Questionnaires were not administered to SIPS as focus group discussion was considered the most appropriate tool for gaining a more in-depth understanding of the activities of SIPS. Moreover, it would not have been feasible to identify a large enough sample of SIPS to obtain reliable quantitative data.

Each section starts with a background of the issue whose results are being analysed, and ends with a summary of findings. Texts are supported by tables and/or graphs where possible to provide more details of the findings. The majority of the findings in this chapter are based on focus group discussions and questionnaire surveys.

Table 13 outlines the data collection and analysis methods and also presents the sections of this chapter that address the respective key research questions.

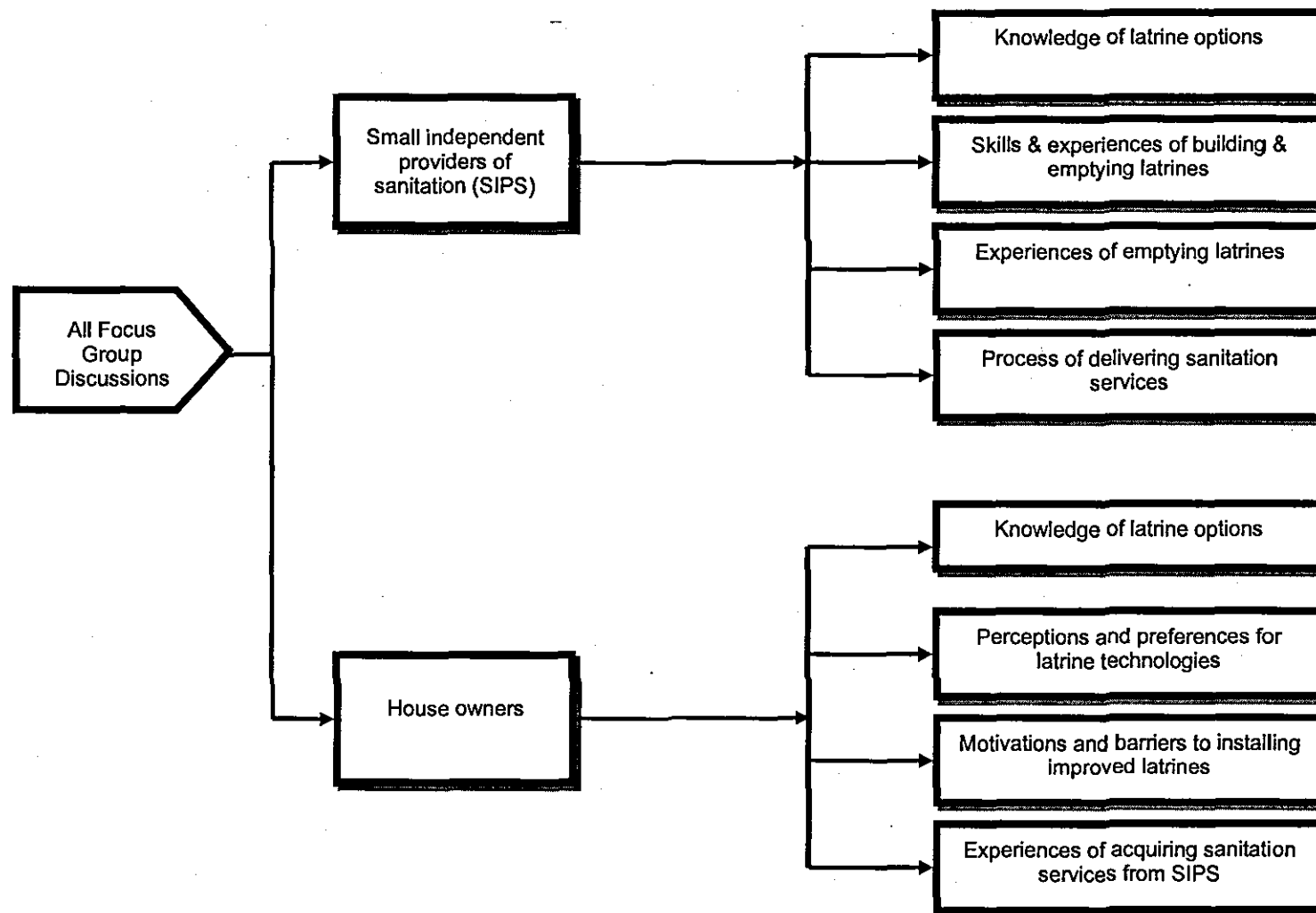
Key research questions	Data Collection Method	Analysis methods	Section
What level of knowledge and awareness of latrine technologies do SIPS possess?	Focus group discussion (FGD)	Qualitative (ATLAS.ti)	4.2
What are the skills and experiences of SIPS in the delivering of sanitation services?	FGD	Qualitative (ATLAS.ti)	4.3; 4.4
What is the nature of house owners' knowledge and preferences for sanitation?	FGD Questionnaire survey	Qualitative (ATLAS.ti) Quantitative (SPSS 15)	4.5 5.8
What are the experiences of house owners with acquiring sanitation services?	FGD Questionnaire survey	Qualitative (ATLAS.ti) Quantitative (SPSS 15)	4.6 5.9

As the main focus of the research is to assess the capacity of SIPS to deliver improved sanitation facilities to users, sections 4.2 - 4.4 explore the knowledge, skills and experiences of SIPS. This is followed by sections 4.5 – 4.6, which explore the level of house owners' awareness of latrine technologies, and their experiences of acquiring sanitation services.

The bulk of the qualitative data is attached in appendix 5, as it was considered too large to present within the main body of the thesis.

The exchange rate for the Tanzania shillings at the time of the study was TZS1,000.00 to USD\$1.00.

Figure 6. Division of Focus Group Discussion (FGD) data.



Part A: Qualitative data analysis

4.2 SIPS' knowledge and awareness of sanitation technologies

4.2.1 Background

In urban areas of many sub-Saharan African countries, the informal sector, rather than externally supported efforts or the public sector, provides the majority of household sanitation facilities. Most latrines are built through the natural market i.e. house owners pay the informal private sector (usually small independent providers) to provide them with latrines. These group of providers are known as 'fundis' in Tanzania, hence the use of the term 'fundi' in the thesis. Literature suggests that one of the sustainable ways of upscaling and accelerating access to improved sanitation is to work in partnership with the informal private sector to develop the sanitation market. This section examines the level of knowledge and awareness of latrine technologies and pit emptying options of small independent providers of sanitation services.

Knowledge and awareness of latrine technologies/options varied amongst different SIPS groups but in general can be divided into three main technology types; *dry, wet and ecological latrines*.

- i. Dry latrines, (e.g. simple pit latrines, pit latrines with sanplats, and ventilated improved latrines): The substructure of dry latrines consists of lined or unlined pits with or without a slab often directly on top of the pit. The superstructure can be made of any local material such as straw, mud, plastic bags, brick or cement blocks with or without roofs.
- ii. Wet/water-based latrines (e.g. pour-flush and water closet latrines): These consist of direct or off-set pits, often lined. The slabs for the pour-flush latrines are made up of integrated plastic, ceramic or cement mortar squatting pans. These latrines use water to flush human waste into the pits. The superstructures are made of bricks or cement blocks completed with roofing sheets, slabs or thatch. The pour-flush latrines mentioned

above are technically not what they seem, as they do not have water seals rather they are lined pit latrines installed with a ceramic squat pan. No wet latrines in the study areas were connected to sewer lines, as only 25% of houses in Dar es Salaam are connected to sewerage systems.

- iii. Ecological latrines (e.g. ecosan): Ecological latrines with the brand name 'ecosan' consist of one or two compartments above ground made of cement blocks. The slabs are made up of integrated plastic or cement mortar squatting pans or ceramic pedestals placed directly on the chambers. The slabs consist of a small hole in front and a bigger hole behind to aid the separation of urine from the faeces. Urine is collected into a container through the small hole via a hose pipe while faeces go directly into the chamber.

Findings from the focus groups indicate that latrines were often differentiated according to their substructure rather the superstructure. They are named according to the materials used for pit lining (e.g. basket, tyre and brick latrines), the type of platform (e.g. 'sungura' [sanplat], and pour-flush) or its operational mechanism. This implies that latrine designs should concentrate on getting the substructure appropriate and affordable. Local names used by small independent providers to identify the various latrine options have been retained in parts of the thesis. All the latrines mentioned are types of on-plot sanitation, which is agreement with the findings of Saywell (2000) that indicated that on-plot latrines are acceptable in urban areas. The respective latrine options are described and supported by sample extracts from focus group discussions with SIPS. Detailed field insight into knowledge amongst 'trained' and 'untrained' SIPS are shown in appendix 5.1.

This section responds to the research question ***'what level of knowledge related to latrine technologies and pit emptying methods do small independent providers possess'?***

4.2.1.1 Traditional pit latrine

These are simple unlined latrines that consist of a pit of about 2-5ft deep and a platform of logs covered with mud. The superstructures are often made with locally available materials such as grass, empty rice sacks, jute bags or plastic sheets. They are built as temporary measures by very poor house owners in areas with stable solid conditions. Only a few of these latrines were encountered in the study areas due to the unstable soil conditions. Many latrine builders knew this option from the rural areas before they came to Dar es Salaam and indicated that there are very few pit latrines in Dar es Salaam. They are very cheap to build, as they are unlined.

The box below demonstrates SIPS' knowledge and awareness of traditional pit latrines. Detailed insights into SIPS' knowledge of traditional pit latrines are shown in appendix 5.1 (box 1), codes P 5: *Keko Mwanga Fundi.txt* - 5:10 (117:117); P10: *FUNDIS (2).txt* - 10:26 (283:285).

Field insight : knowledge of traditional pit latrine

Case 3
Municipality: Ilala
Ward: Buguruni/Vinvinguti/Mbagala
Case description: Trained sanitation providers

Quotations:

P 7: trainednot supported(1).txt - 7:19 (202:204) Codes: [knowlat] [Traditional pit]

Fundi 8: There are local latrines, which are not within the standard that we can build. A person digs a pit, finds cashew tree logs, arranges them and covers them with earth. This depends on economic condition of people. These latrines are called pit latrines.

4.2.1.2 Basket latrine

This is usually a simple pit latrine lined with baskets woven from palm fronds. The platform is made of compacted mud integrated with a round metal tin to serve as the drop hole. The superstructure is often made from straw, as this is considered a very temporary latrine and the first step in the sanitation ladder for poor households in areas with unstable soil. Basket latrines are rarely built these days and have since been replaced by other lining methods. Many of the small independent providers were not aware of the basket latrine. Detailed

insight into SIPS' knowledge of basket latrines are shown in appendix 5.1 (box 2), codes *P 5: Keko Mwanga Fundi.txt - 5:62 (614:619)*, *P 7: trained not supported (1).txt - 7:31 (259:263)* [fundi 8].

Case history: Basket latrine

Case 2
Municipality: Ilala
Ward: Buguruni/Vinvinguti/Mbagala
Case description: Trained sanitation providers

Quotations:

P 7: trained & not supported(1).txt - 7:31 (259:263) (Super) Codes: [basket latrine]

Fundi 11: Another pit latrine is the one whose pit is lined with twigs of a tree to prevent it from collapsing; the twigs are woven to make some sort of a basket that is fitted into the pit. The depth is about 5ft and the width is about 4ft. The latrine is dangerous but people built it because of poor economic condition.

4.2.1.3 Tyre latrine

This is also a type of pit latrine lined with used vehicle tyres. The depth of the pit depends on the number of tyres that the house owner can provide. The platform is made of compressed mud and finished off with cement mortar around a drop hole made from a metal tin. This is considered a temporary latrine and therefore the superstructure is often made from straw, plastic sheet or mud. Tyre latrines cannot be emptied and are abandoned when full. Tyre latrines are still being built as the cheapest option in the sanitation ladder, although it is not considered a good latrine. As it cannot be emptied, it is not durable and house owners with this type of latrine find themselves without a facility within in a short while. Considering that the tyres are not dug out or reused, they remain underground and create difficulty when house owners want to install an improved latrine.

Tyre latrines are relatively well known amongst trained and untrained SIPS.

Detailed insight into SIPS knowledge of tyre latrines are shown in appendix 5.1 (box 3), codes *P10: Fundis no. 7 Veta (2).txt - 10:16 (199:201)*, *P 7: trained not supported (1).txt - 7:28 (240:246)* and *P 5: Keko Mwanga Fundi.txt - 5:63 (622:624)*.

Case history: Tyre latrine

UNTRAINED SANITATION PROVIDERS

Case 1
Municipality: Temeke
Ward: Mamboleo B
Case description: Untrained sanitation providers

Quotations:

P 2: Maboleo b untrained.txt - 2:21 (211:213) (Super) Codes: [tyre latrine]

Fundi-1: There is a tyre latrine (choo cha tairi). You dig a pit and fit in car tyres one on top of the other, even 10 tyres, you then lay cement blocks, 2 courses, after the blocks, you arrange the logs, you do the covering and finally make an enclosure. People can start using the facility.

4.2.1.4 Drum latrine

This is a type of pit latrine lined with 200 litre metal drums and the depth depends on the number of drums that a house owner can afford. The drums are cut open on both sides except for the top most one. The last drum is turned upside down and a small hole cut in the middle to serve as the drop hole. Drum latrines are perceived to be a more acceptable first step in the sanitation ladder, as they are more stable and last longer than all the other temporary latrines. In reality, drum latrines are the third step in the sanitation ladder after the basket and the tyre latrine. It is perceived as the cheaper alternative to lining with bricks or cement blocks. Similar to the tyre, drums used in lining latrines are rarely excavated when full; the owners simply shift to another site if they have space. This further compounds the problem of space for latrines in low-income urban settlements.

Detailed insights into SIPS' knowledge of drum latrines are shown in appendix 5.1 (box 4), codes *P 1: Kombo fundis.txt - 1:26 (165:167)*, *P 2: Maboleo b untrained.txt - 2:14 (135:140)*, *P 7: trainednot supported (1).txt - 7:20 (207:209)*, *P 8: fundi's keko Veta (1).txt - 8:16 (260:265)*.

Case history: drum latrine

Case 3
Municipality: Temeke
Ward: Keko Mwanga B
Case description: Trained sanitation providers

Quotations:

P 5: Keko Mwanga Fundi.txt - 5:11 (118:118) (Super) Codes: [drum latrine] [knowlat]

Fundi 1: Drum latrines 'vyoo vya pipa' It consists of three drums. You dig a hole and sink the drums after you've removed the bottom parts of two of them. The top drums are turned upside down and small drop hole is made in the middle. It is then finished off using cement mortar and the latrine is complete.

4.2.1.5 Brick latrines

This is the most common and widely accepted type of latrine found in all the study areas and it consists of a pit lined with cement blocks. It is a more permanent type of latrine, which is perceived as the most durable and suitable by most of the latrine builders. It is often referred to as the 'good' latrine and many households aspire to this latrine. Although it is difficult to empty, it is easier than the three previous options. In areas of high water table, shallow pits are dug and then raised above ground to provide more storage capacity. All the latrine builders have had years of experiences and skills of building 'brick' latrines in various soil conditions in the low-income urban settlements. Selected quotations demonstrating SIPS' knowledge of this latrine option are presented in the box below. Detailed field insight can be seen in appendix 5.1 (box 5), codes *P 2: Maboaleo b untrained.txt - 2:12 (113:119)* and *P 7: trainednot supported (1).txt - 7:26 (231:233)*.

Case history: Brick latrine

Case 2
Municipality: Kinondoni
Ward: Kwakupa
Case description: Untrained sanitation providers

Quotations:

P 3: paired fundi interview.txt - 3:1 (14:23) (Super) Codes: [knowlat] [Pit latrine]

Fundi 1: They are pit latrines. The first type, you can build a latrine (by lining the pit with blocks) in circular or in rectangular shape, depending on how the pit was dug. You can line a square/rectangular pit with blocks laid in an upright position or flat in the pit, but not broken into 2. You can line a circular pit with blocks laid flat or upright and broken into two. Of all the 4 ways of lining the pit, the most durable is the one lined with blocks broken into two and laid flat.

4.2.1.6 'Sungura' (sanplat) latrines

This type of pit latrine is similar to the brick latrine with the only difference being the type of slab used on the platform where the drop hole and the foot rests resembles the head of a rabbit hence the name 'sungura' (Swahili word for rabbit). This option was introduced by a NGO and many latrine builders were trained in the fabrication of the 'sungura' slab, which can be found being sold on the side of some of the major roads in Dar es Salaam. However, there was no evidence of this latrine option in the study areas indicating that it did not take off in the informal low-income settlements. It is important to note that only the groups of trained sanitation providers were aware of this latrine option. Detailed field insight can be seen in appendix 5.1 (box 6), codes **P 8: fundi's keko Veta (1).txt - 8:40 (552:558) (fundi 1&3).**

Field insight: Sungura latrine

Case 1
Municipality: Temeke
Ward: Keko Magurumbasi (ZamCargo)
Case description: Trained sanitation providers

Quotations:

P 8: fundi's keko Veta(1).txt - 8:40 (552:558) (Super) Codes: [knowlat] [sanplat]

Fundi 2: It is a sink that was brought by the Chinese. You just take an ordinary latrine, put logs, then plaster it, put the sungura to improve it and keep it clean and it is very appealing. It is called sungura because the hole looks smaller than it is, so this is a bit tricky maybe that's why it is called that, because a hare is known to be tricky.

4.2.1.7 Ecosan latrines

'Ecosan' is a brand name for a type of ecological latrine that allows for the separation of faeces and urine. In the study areas where they exist, they are locally known as 'ekologia'. The substructure consists of two compartments built with cement blocks above ground with access hatch behind. The platform is made up of a squat slab or pedestal with a small hole in front and a bigger hole behind. In theory the small hole is positioned in such a way that urine can be directed through it when in use while the bigger one serves as the drop hole for the faeces. Urine is discharged through a hose pipe to a container outside the latrine and diluted with water to be used as fertiliser or disposed of. Only one compartment is used at any one time until it fills up and the family can move to the second chamber. It is assumed that by the time the second chamber is full, the contents of the first chamber would have degenerated and are no longer harmful and can therefore be used as manure.

Ecosan was a new technology that was introduced by NGOs shortly before the research. They were seen in only two sites and many of the latrine builders have never seen or built one except for those who have been trained by the NGOs. No group of untrained sanitation providers mentioned this latrine option. There seem to be mixed feelings about it especially with handling human faeces during emptying. Moreover, the majority of the areas are high density settlements and do not have any space for kitchen gardens. Therefore, the resulting manures from faeces and urine are of no use to the households. It is not known how the few households with this latrine will handle it when they fill up, as they are still very new. Detailed field insight can be seen in appendix 5.1 (box 7), codes *P 8: fundi's keko Veta (1).txt - 8:26 (399:407)* and *P10: Fundis No. 7 Veta (2).txt - 10:138 (1883:1888)*.

Field insight: Ecosan latrine

Case 1
Municipality: Ilala
Ward: Buguruni/Vinvinguti/Mbagala
Case description: Trained sanitation providers

Quotations:

P 7: trainednot supported(1).txt - 7:13 (129:135) (Super) Codes: [ecosan] [Pit latrine]

Fundi 7: I know two types of latrines: 1. The common pit latrines 2. The ecosan latrine. The good thing with ecosan latrines is that there is no danger of being toppled by earth, as they do not have a pit for one to go underground. The problem with the latrines is their filling up and there is no water. The common pit latrines are dangerous especially when lining during rain season. The pit can collapse when you are in the pit working.

4.2.1.8 Pour-flush latrine

This is a different technology from all the previously described ones, as it is a water-based technology. It is generally known as the 'sink' latrine in the study areas, the name for the ceramic squat pans integrated in the slab. Pour-flush latrines can either have off-set or direct pit options, single or double pits. The direct pit pour-flush latrine is similar to the brick latrine except that a water seal squat pan is integrated in the slab. The off-set pour-flush latrine consists of a single or double pit located slightly away from the super structure depending on the availability of space. The slab with an integrated water seal squat pan is connected to the off-set pit through a PVC pipe. In areas of high water table or reasonable space, twin off-set pits are often preferred, as this enables households to alternate between the pits when one is full. As the name implies, pour-flush latrines require water to flush faeces down the pits. This can be a problem where water is scarce, as is the case in most of the study areas.

Pour-flush latrines are seen as the technology for the 'rich' people in the study areas and are often found in houses of local politicians or business men. Although it is not much more expensive than the 'brick' latrine, it is considered so due to the requirement to use water. The majority of the latrine builders are aware of this technology. According to SIPS, some house owners that cannot afford the real pour-flush request them to install a ceramic squat pan on their brick latrine except that it will not have a water seal. The box below presents an insight into SIPS' knowledge of the pour-flush latrine technology. Detailed field

insight can be seen in appendix 5.1 (box 8), codes *P 9: fundi manzese and tandale (1).txt - 9:10 (204:205) and P 7: trained (1).txt - 7:16 (153:158) (Super)*.

Field insight: Pour-flush latrine

Case 2
Municipality: Temeke
Ward: Mamboleo B
Case description: Untrained sanitation providers

Quotations:

P 2: Maboleo b untrained.txt - 2:16 (167:171) (Super) Codes: [flush latrine] [knowlat]

Fundi 4: There are latrines, for example, for people with ample space, you dig a pit, line it to the top. There are people who do not like the superstructure built on top of the pit therefore they build aside two or three rooms, a bathroom, and a sink latrine, the sinks are used outside, because you have sinks for in-house use and for the latrine located outside the house. After using the facility, the waste is flushed far outside into the tanks.

4.2.1.9 Water Closet – flush latrine

This is generally known as the ‘western’ latrine and is commonly found in offices, middle- and high-income areas. They are located inside the house and consist of a super structure, septic and soak tanks. Only five water closet latrines were found in the study areas, as they require huge amounts of water to maintain and also require ample space for the tanks. Due to poor access to most of the areas, emptying of full septic tanks is a major issue and even discourages more people from this technology. In a few areas in Dar es Salaam, these types of latrines are connected to sewers.

The water closet latrine is considered the highest option in the sanitation ladder and above the means of most residents of the low-income settlement. Due to the high installation and maintenance cost, it is not considered a sustainable option for low-income settlements by most of the latrine builders. All the latrine builders are aware of this technology and have seen them in government offices and in houses in middle- and high-income areas. None of the trained groups of sanitation providers mentioned this option probably because it is an option that they have not been trained on. Many have also never built this type of latrine. The box below provides some insight into the level of SIPS awareness of this

technology. Detailed field insight is shown in appendix 5.1 (box 9), codes *P 6: Frogmen - FGD.txt - 6:4 (25:30) and P 2: Mableo b untrained.txt - 2:12 (113:119) [fundi 7&12]*.

Field insight: Water closet (flush latrine)

Case 1
Municipality: Temeke
Ward: Mableo B
Case description: Untrained sanitation providers

Quotations:

P 2: Mableo b untrained.txt - 2:12 (113:119) (Super) Codes: [flush latrine] [knowlat]

Fundi-1: I know the latrines in Uswahilini, and there is this modern latrine, they are usually located inside the house (self contained). With these latrines, they install the sinks and pipes 4" PVC to carry the waste into the pits (a septic tank and another soak pit). The first tank retains the waste as mud and the other tank keeps waste water (liquid). In places where people have developed agriculture, they use it in the fields as a type of manure.

4.2.2 Summary of SIPS knowledge of sanitation options

The case histories in the boxes in sections 4.2.2.1 – 4.2.2.9 highlight the different latrine technologies/options that small independent providers in low-income settlements of Dar es Salaam are aware of. The case history shows that small independent providers who have attended training organised by NGOs or other aid agencies were aware of more latrine options than those who have not attended any training. The level of knowledge and awareness of latrine options amongst the different groups of small independent providers is summarised in the table 4.2 below.

The findings in relation to research questions 1 indicate that the knowledge of latrine technologies amongst the majority of SIPS is limited to the pit latrine technology. However, a few of the SIPS that have attended training organised by NGOs had more knowledge of other technologies such as the pour flush and the ecological latrines. This has implications on whether SIPS capacity can be developed to upscale the delivery of improved sanitation and who is in the best position to support this. The implications of findings is discussed in chapter 5.

Table 14. Knowledge and awareness of latrine options amongst groups of SIPS

Case description	Municipality/ Ward	Latrines known								
		Pit	Basket	Tyre	Drum	Brick	Sanplat	Ecosan	Pour - flush	WC
Untrained	<i>Temeke</i> • Keko MA • Mamboleo B	Yes		Yes Yes	Yes	Yes			Yes	Yes
	<i>Ilala</i> • Kombo				Yes					
	<i>Kinondoni - MwaNyamala</i> • Kwa Kupa					Yes				
Trained	<i>Ilala</i> • Buguruni /Vininguti /Mbagala	Yes	Yes	Yes	Yes	Yes		Yes		Yes
	<i>Temeke</i> • Keko MB • Keko Magrumbasi	Yes	Yes	Yes	Yes Yes		Yes	Yes Yes		Yes Yes
Pit Emptiers	• Mixed									Yes

4.2.3 SIPS' perceived performance of sanitation options

This section describes the perception of SIPS regarding the performance of the various latrine technologies and options discussed in the previous sections. It provides the field insight into the operation and performance of the various latrines. The indicators for a good latrine include durability, safety, shape of pit (round), lining material, easy access for emptying and affordability. Latrines that use water to flush out faeces into offset pits are perceived as the best but the cost of installation and maintenance makes them unsuitable for low-income earners.

A general perception amongst trained and untrained SIPS is that round pits lined with blocks broken into two and laid flat are the best and the most durable, and suitable for low-income urban settlements. SIPS that have the knowledge and skills for ecosan seem to think that it is the best because of easy access for emptying and the possibility of building above ground, which is good for areas with high water table. Only a few builders mentioned drum and tyre latrines but

as a last choice for those who cannot afford anything better. The box below gives some field insight into SIPS' perception of latrine options. Detailed insights are shown in appendix 5.2 with the following codes;

P 1: Dummy fundis.txt - 1:5 (45:53) (Super) Codes: [latrank]; P 2: Mableo b untrained.txt - 2:39 (378:380) (Super) Codes: [latrank] [roundpitrank]; P 3: paired fundi interview.txt - 3:1 (14:23) (Super) Codes: [latrank] [Pit latrine]; P10: fundis no. 7 veta (2).txt - 10:22 (256:257) (Super) Codes: [latrank]; P 7: trainednot supported (1).txt - 7:32 (267:267) (Super) Codes: [latrank]; P 5: Keko Mwanga Fundi.txt - 5:16 (135:137) (Super) Codes: [lat durability] [latemptdiff]; P 8: fundi's keko Veta (1).txt - 8:2 (148:148) (Super) Codes: [ecosan] [knowlat] [skeplat]

Field insight: SIPS perception of latrine options

Case 2
Municipality: Temeke
Ward: Mableo B
Case description: Untrained sanitation providers

Quotations:

P 2: Mableo b untrained.txt - 2:39 (378:380) (Super) Codes: [latrank] [roundpitrank]

Fundi-11: The latrines that are connected to the drainage system are the best, there is no pit, even when there is an earthquake, and your latrine will remain. And the main pipe can take the waste to the sea.

Fundi-10: As a fundi, the latrine that I consider most durable and modern is the one with two tanks, one tank for solid waste and the other for wastewater. This is to rank no. 1, but when we consider the real situation in Uswahilini, that people cannot afford this type of latrine, the latrine with the concrete ground base, round pit lined with pieces of blocks laid flat and plastered, this is the best.

I have built three types; drum latrines, the common round ones and rock latrines, but this type is widely built along the beach because there rocks are easily obtained, especially in Zanzibar where I stayed. But there are merits and demerits with these latrines, for example, with rock latrines, the merit is that they last longer, and the demerit is that you cannot plaster the rocks because of their shape, and the type of rock they use is called 'fasi' (coral reef) which have multiple holes, so when the water in the pit reaches a certain level, it will seep out, so it is impossible to apply plaster.

4.2.4 SIPS' perception of households' preferences and aspiration

This section gives insight into house owners' sanitation preferences and aspirations based on the experiences of SIPS. It examines the type of latrines and key attributes that house owner's demand from SIPS. This section will provide an opportunity to compare findings from house owners regarding their own sanitation preferences and aspirations in section 4.5.

The majority of the SIPS, both trained and untrained, agreed that round pit latrines lined with blocks are the most preferred option by households. Lined pit latrines (where possible installed with a vent pipe) are popular because of their durability and ease of use. This has been tried and tested over time with a widely known maintenance system and easier access for emptying, even if expensive. Poor households that cannot afford lined pit latrines go for pits lined with drums until they save up enough money to upgrade to a block-lined pit latrine.

Many people aspire to a flush latrine but the cost of installation and the lack of regular access to water supply make it unaffordable for most households in the informal low-income settlements. Instead, house owners request SIPS to install a 'sink' (white ceramic squat pan) and to place the pit slightly away from the superstructure of the latrine. This imitates a pour-flush latrine but often without the water seal. Others with limited space have squat pans installed directly on the pit.

Insights into SIPS' perceptions are outlined in the box below with details shown in appendix 5.3 with the following codes;

P 3: paired fundi interview.txt - 3:11 (91:94) (Super) Codes: [Hhlatpref]

P 4: fundis vingunguti.txt - 4:9 (226:226) (Super) Codes: [Hhlatpref]

P 6: Frogmen - FGD.txt - 6:2 (11:15) (Super) Codes: [Hhlatpref] [knowlat] [latempty]

P10: FUNDIS NO. 7 VETA (2).txt - 10:83 (929:933) (Super) Codes: [Hhlatpref]

P 5: Keko Mwanga Fundi.txt - 5:59 (506:513) (Super) Codes: [Hhlatpref]

P 7: trainednot supported (1).txt - 7:18 (194:199) (Super) Codes: [Hhlatpref] [skeplat]

P 8: fundi's keko Veta (1).txt - 8:20 (349:353) (Super) Codes: [Hhlatpref]

Field insight: SIPS perceptions of house owners' latrine preferences and aspiration

Case 1
Municipality: Temeke
Ward: Mtoni/Kombo
Case description: Untrained sanitation providers

Quotation:

P 1: Dummy fundis.txt - 1:10 (66:69) (Super) Codes: [Hhlatpref]

Qn: Of the 4 latrines mentioned, which ones do the people demand the most?

Fundi 1: It depends on the category of the people in need of the latrine, that is, the poor who can only afford basket latrines, and the middle-income who prefer direct pit latrines, and the rich who prefer flush latrines. The majority of the people in Mtoni have direct pit latrines, about ¾ of them, then few people have drum latrines ¼ and significantly very few have the flush latrine. More people opt for the direct latrine, (though it is difficult to empty) because of the water scarcity in Mtoni. The squat pit latrine is preferred by most because of the fear of diseases such as stomach ache, dysentery, cholera etc if they sit on a shared latrine.

Case 2
Municipality: Temeke
Ward: Mableleo B
Case description: Untrained sanitation providers

Quotations:

P 2: Maboleo b untrained.txt - 2:20 (205:208) (Super) Codes: [Hhlatpref]

Fundi 1: For a 'well off' individual who also has space, you can dig a pit, pour concrete on the ground base, start lining by laying the blocks flat to the top and he can tell you to do the plastering of the pit after do the finishing with 'nilu' (plinth) so that when the pit fills up he will be able to hire a truck for emptying.

Case 8
Municipality: Ilala
Ward: Buguruni/Vinvinguti/Mbagala
Case description: Trained sanitation providers

Quotations:

P 7: trainednot supported(1).txt - 7:18 (194:199) (Super) Codes: [Hhlatpref] [skeplat]

Fundi 10: People in these areas do not prefer this type of latrine, they prefer pit latrines, and they are used to it. But I would like to see ecosan latrines built in dry areas because they are advantageous in that the environment remains clean (unpolluted) they do not smell. And when one pit fills up it is closed and the excreta dries up, after all it is not mixed with urine. Therefore in a month's time the excreta would have turned into dry substance which you can handle and get no infection, as there would be no any living organisms. So you have manure.

4.3 Skills and Experiences of small independent providers

4.3.1 Introduction

This section assesses the skills of small independent providers of sanitation and their experiences of delivering sanitation to households. It examines emptying practices, and factors that constrain scaling up the delivery of improved sanitation by small independent providers. The section is divided into five sub sections; 4.3.2 explores SIPS' skills and experiences of constructing different latrine options; 4.3.3 describes SIPS' experiences of building latrine superstructures; 4.3.4 examines their skills and experiences of emptying latrines, while section 4.3.5 looks into how SIPS acquired their skills.

Over 98% of the existing latrines in the low-income urban settlements were provided by small independent providers paid for by the house owners. These sanitation facilities range from being in very poor hygienic conditions to fairly good conditions. SIPS have been grouped into 'trained' and 'untrained', which provides an opportunity to compare the two groups and assess if there is a difference in their skills and experiences. The third group are those that provide emptying services.

4.3.2 SIPS experience of building and emptying latrines

The latrines built by SIPS in low-income urban settlements can be placed into four group levels. Group level 1 consists of the lowest cost options, which includes traditional pit, basket, tyre and drum latrines. According to SIPS, basket latrines are rarely demanded, and only a few households still go for tyre latrines. Although drum latrines are the cheapest and least acceptable option, latrine builders consider this option a waste of money because it is very temporary and does not last for long.

Group level 2 consists of 'brick' and sanplat latrines. Both trained and untrained sanitation providers have had experiences of building brick latrines. A general perception amongst SIPS is that round pits lined with blocks broken into two and laid flat are the best and the most durable. Stone is the preferred choice of lining, as the pits are said to last longer, however, lining pits with stones is no longer a

common practice due to the high cost of stones. Some trained SIPS use interlocking trapezoidal blocks, which do not require cement mortar, however the majority of them are sceptical of this method of lining. Blocks held together with cement mortar are still the most widely used method of lining. This the SIPS attributed to the wide availability of cement blocks that do not require specialised moulds or training.

Group level 3 consists of the ecosan and pour-flush latrine. These are relatively new technologies for the SIPS and were introduced by NGOs just before this study commenced. The few existing ecosan latrines were seen in two areas where WaterAid and EEPCO are implementing water and sanitation projects. It is therefore not surprising that only SIPS that have attended WaterAid training have the skills for building ecosan.

Both trained and untrained SIPS are experienced in building latrines similar to the pour-flush technology. However, the untrained SIPS do not seem to understand the concept of the water seal in a pour-flush latrine, thus the latrines are not installed with a u-bend that provides a water seal. Although users of the common pour-flush still use water to flush, the technology is practically a lined pit latrine and may sometimes smell. Pour-flush technology that requires less water for flushing was introduced by WaterAid into one of the study sites and a few SIPS were trained to build these latrines. The lack of appropriate pour-flush pans in the market means that they continue to use the squat pans that require large amount of water for flushing if a u-bend is installed. For this same reason, trained SIPS continue to install pour-flush latrines without water seals.

Group level 4 consists of the Water Closet (WC) toilet considered the highest in the sanitation ladder. Small independent providers working in low-income urban settlements do not often get the opportunity to build WC latrines, as they are left for those who have been to technical colleges. The high cost of installation and maintenance makes WCs unaffordable for residents of low-income areas.

Extracts from focus group discussion showing field insight into latrine building skills of SIPS in low-income urban communities are shown in the boxes in sections

4.3.2.1 to 4.3.2.4. Details of the extracts from focus group discussions can be found in appendix 5.4.

4.3.2.1 Experience of building group level 1 latrines

This section describes the skills and experiences of SIPS for building basket, tyre and drum latrines. SIPS indicated that these latrine options are not popular choices except for the very poor households and only a few of them have built them, particularly basket and tyre latrines. On the other hand, there is suggestion to indicate that the drum latrine is a more acceptable option than tyre and basket options, and that some households still go for them. The box below presents field insight into SIPS experiences of building basket, tyre and drum latrines. Detailed field insights are shown in appendix 5.4, (box 11) with the following codes:

- P 4: fundis vingunguti.txt - 4:5 (141:142) (Super); Codes: [skeplat] [tyre latrine]*
- P 2: Maboaleo b untrained.txt - 2:36 (349:359) (Super) Codes: [pitlinning] [skeplat]*
- P 7: trainednot supported (1).txt - 7:31 (259:263) Codes: [basket latrine] [skeplat]*
- P 8: fundi's keko Veta (1).txt - 8:18 (303:306) (Super) - Codes: [skeplat] [tyre latrine]*

Field insight: Experience of building basket, tyre and drum latrines

Case 2
Municipality: Temeke
Ward: Mamboleo B
Case description: Untrained sanitation providers

Quotations:

P 2: Maboaleo b untrained.txt - 2:36 (349:359) (Super) Codes: [pitlinning] [skeplat]

Fundi-4: There is one type of latrine that I built, the building started with the outside because of the condition of the owner, I told him to go and get iron sheets and timber. We made with material, something like a box 8ft high. He made up his mind that if he was to put a drum and his house had many people, it would fill up in a short time, and he had no blocks or the capacity to build a strong and durable latrine. So he told me to build him a latrine that can last at least 3 to 4 years. The enclosure was like a big tank but square and we dug a pit, there were 4 or 5 of us to lift the box to fit it down the pit and when fixed, we then built on the outside a three course wall (block). So that the logs he had bought would cross and rest on it. We collected pieces of blocks rocks and poured concrete at the top to cover the pit. We made two holes, and thereafter a 4" block wall, which the concrete work can support. We made a partition so that we got two rooms. Till today the facility is still in use.

4.3.2.2 Experience of building group level 2 latrines

Brick latrines are the most commonly built latrines in the low-income settlements because they are seen as reasonably affordable and durable. The case histories in the box below suggest that the majority of the sanitation providers (trained and untrained) have experience of building brick latrines. This is supported by selected extracts from focus group discussion showing field insight into experiences and skills for brick latrines. Detailed field insights are shown in appendix 5.4 (box 12) with the following codes:

P 2: Maboaleo b untrained.txt - 2:4 (34:37),

P 9: fundi manzese and tandale(1).txt - 9:14(242:244),

P 7: trainednot supported(1).txt - 7:16 (153:158),

P 5: Keko Mwanga Fundi.txt - 5:46 (405:410) and

P 8: fundi's keko Veta(1).txt - 8:3 (154:154).

Field insight: Building brick latrines

UNTRAINED SANITATION PROVIDERS

Case 1
Municipality: Ilala
Ward: Kombo
Case description: Untrained sanitation providers

Quotations:

P 1: Dummy fundis.txt - 1:1 (21:26) (Super) Codes: [Pit latrine] [skeplat]

Fundi 1: Yes, I have built latrines in Mtoni, direct pit latrines- 12ft deep, lined with cement blocks, covered and provided with a drop hole. In the direct pit latrine, the excreta material drops directly into the pit, while with the flush latrine the excreta material is carried away into the chamber outside through a pipe after it has been flushed with water. The number of blocks for lining a 10ft pit entirely depends on how the customer wants the blocks to be laid, flat or in upright position. So, for laying blocks flat, 200 blocks will be needed, and for the upright position, 150 blocks will be needed. The blocks are 5" or 6" in size. To mould blocks, one bag of cement is mixed with 120 'kairas' (head pans) of sand to make 30 blocks of 5" size. You will get 200 blocks from 7 bags of cement.

4.3.2.3 Experience of building group level 3 latrines

Ecological sanitation with the brand name 'ecosan' was a new technology in the study areas. The majority of the SIPS did not have the skills or experiences of building ecosan latrines except for those that had attended NGOs' organised

training; however, few untrained SIPS were beginning to copy this option. SIPS' experiences of building ecosan latrines are presented in the box below. Detailed field insights are shown in appendix 5.4 (box 13) with the following codes: *P10: Fundis no. 7 Veta (2).txt - 10:163 (1883:1889) and P 7: trainednot supported (1).txt - 7:17 (169:189).*

Pour-flush latrines installed with water seals were relatively new in the study areas. However, both trained and untrained SIPS have been building some form of pour-flush latrines, often direct pit options. In many cases where households originally installed brick latrines, they tend to upgrade it by installing a squat pan but without a water seal. The study found that many SIPS, particularly untrained ones, misunderstood the pour-flush technology. The key attribute of a pour-flush latrine is the installation of a water seal that helps prevent the latrines from smelling. The box below describes SIPS' experiences of building pour-flush latrines. Detailed insights are shown in appendix 5.4 (box 14) with the following codes: *P10: Fundis no. 7 Veta (2).txt - 10:160 (773:777), P9: fundi Manzese and Tandale (1).txt – 7:16 (153:158), P7: trainednot supported (1).txt - 7:16 (153:158).*

Field insight: Building group level 3 latrines

Ecosan latrines

Case 2
Municipality: Temeke
Ward: Keko Magurumbasi (ZamCargo)
Case description: Trained sanitation providers

Quotations:

P 8: fundi's keko Veta(1).txt - 8:26 (399:407) (Super) Codes: [ecosan] [skeplat]

Fundi 1: First of all you dig up a pit then you lay a foundation with blocks, then you pour ballast at the base up to about 1ft for the cover and put a simple square structure with a partition wall in the middle. You then plaster it and fit the seats with two holes, one for urine because the ecosan latrine separates urine from faeces. Water and urine go one way while the other waste goes another way. You then put trap doors at the backs of the two compartments to create access for emptying. People like it very much because it empties into the garden and it is profitable. It has many advantages like building it anywhere; conserving the environment and it is clean such that it doesn't attract flies unlike in the past whereby the tanks would be working today and spoilt the following day.

Pour-flush latrines

Case	3
Municipality:	Temeke
Ward:	Keko Magurumbasi (ZamCargo)
Case description:	Trained sanitation providers

Quotations:

P 8: fundi's keko Veta(1).txt - 8:19 (321:338) (Super) Codes: [pour-flush] [skeplat]

Fundi 3: Eh, the preparation is not different from other pit latrines. First of all you prepare the place by digging a pit depending on how deep the customer wants it eh, these off-set latrines are about twelve feet deep and eight feet wide but you can exceed this depending on the ability and the pit that has been dug. When you are done with lining, you start covering the latrine. There are two types of coverings, a person who is able will use reinforced concrete slab (building rods, cement, ballast) and another person may use logs that are strong and well arranged then you put cement on it. The off-set means that when they dig the pit away from where your latrine structure with squatting pan will be. This will be either inside the house or you will put up a simple structure beside and use ceramic squatting pans that are sold in the shops. Eh the sink (squat pan) is prepared and well arranged until it is appealing. Under the sink you don't use the normal WC elbow (water seal) but a sharp sloping elbow connected to a 4" PVC pipe. Then you make a slope into the pit. When you have completed this then it means it is an off-set. You don't need a lot of water to flush it down to the pit and the water seal prevents smell.

4.3.2.4 Experience of building water closet latrines

Water closet (WC) latrine is not a common technology in the study areas. SIPS working in low-income urban settlements do not often get the opportunity to build WC latrines, as they are left for those who have been to technical colleges. The few that have built WC latrines were assistants to the main builder. It is regarded as a latrine for the rich whose houses are connected to the city water supply or who can afford to pay for constant water supply.

The box below shows some field insight into the experiences and skills of a few SIPS that have built WCs. Detailed insights are shown in appendix 5.4 (box 15) with the following codes:

P 1: Dummy fundis.txt - 1:1 (21:26) (Super) Codes: [flush latrine] [Pit latrine] [skeplat]

P 2: Maboaleo b untrained.txt - 2:16 (167:171) (Super) Codes: [flush latrine] [knowlat]

P 3: paired fundi interview.txt - 3:3 (43:45) (Super) Codes: [flush latrine] [knowlat]

P 8: fundi's keko Veta (1).txt - 8:12 (226:231) (Super) Codes: [flush latrine] [skeplat]

Field Insight: Building WC latrines

Case 2
Municipality: Temeke
Ward: Mamboleo B
Case description: Untrained sanitation providers

Quotations:

P 2: Maboleo b untrained.txt - 2:16 (167:171) (Super)Codes: [flush latrine] [knowlat]

Fundi-1: As the last person said, I too have built the latrines when I was working with Kanoike Co. when constructing the main road in Science area (Kijitonyama). Behind 'science' the area overlooking Kinondoni - MwaNyamala, you will find a big number of latrines of this kind. You have a big pipe in the middle of the road and every 10-20 metres, there is a chamber and sewage from the houses is channelled to the main pipe.

4.3.3 Experience of building latrine superstructure

Superstructures of latrines are made with various types of material depending on what the house owner can afford. The materials used range from recycled waste, plastic sheets, wood, iron roofing sheets and bricks. Some of the SIPS have carpentry skills and can complete a superstructure while others only have masonry skills. Both trained and untrained SIPS are capable of building superstructure but the type depends on the cost and preference of the house owners.

The majority of the brick latrines have superstructures made with cement blocks while latrines in Group level 1 are made with thatch grass, as they are considered temporary latrines. According to SIPS, many house owners with brick latrines often ask for half a superstructure, as they cannot afford the cost of a complete one. Latrines with incomplete superstructure are called 'passport' latrines because people can be seen from the shoulder upwards when they stand in the latrine. There is no major difference between the type of superstructure built by trained and untrained small independent providers. The case histories in the box below describe SIPS' experiences of building latrine superstructures. Detailed field insight can be seen in appendix 5.5 with the following codes:

P 1: Dummy fundis.txt - 1:19 (129:130) (Super) Codes: [laTZSupstr]

P 2: Maboleo b untrained.txt - 2:24 (236:249) (Super) Codes: [laTZSupstr]

P 4: fundis vingunguti.txt - 4:7 (210:211) (Super) Codes: [laTZSupstr]

P10: FUNDIS NO. 7 VETA (2).txt - 10:13 (174:178) (Super) Codes: [laTZSupstr]

Field insight: Building latrine superstructure and rehabilitation

Case 2
Municipality: Temeke
Ward: Mamboleo B
Case description: Untrained sanitation providers

Quotations:

P 2: Maboleo b untrained.txt - 2:24 (236:249) (Super)Codes: [laTZSupstr]

Fundi 4: The shelter, whether he would like it on top of the pit or somewhere. If it is on top of the pit, 200 blocks are required @ TZS400/- each. Concrete: 3 bags for building the shelter, two bags of cement will be used for the foundation, and there is one bag for finishing off the floor and another bag for plastering the inside part of the shelter. Roof: Timber 3 (2x4") @ TZS2,000/- each; 3 (2x2") @ TZS1,000/- each; corrugated iron sheets: 3 @ 7,500/- each; roofing nails: 0.5kg for TZS1,500; 0.5kg (3") nails for TZS1,000; 1 Door (cypress timber) for TZS8,000 or 'mpodo' timber for 15,000 (more durable). For a door made from iron sheet, you need 1 corrugated iron sheet @ TZS7,500, timber 2 (2x4") @ TZS2,000 each. Such a door costs 10,000/- or 15,000/

4.3.4 Experiences of emptying latrines

This section describes pit emptying methods and mechanisms used by small independent sanitation providers. SIPS voiced their concerns with the difficulty in emptying the majority of the existing latrine types in the study areas. In many instances, criteria for a good latrine often include easy access for emptying. Emptying of pit latrines is done manually by people known locally as 'frog men'. Only pits lined with bricks, stones and cement blocks are emptied. The cost of emptying full pits ranges from TZS30,000 to TZS100,00 depending on the depth of the latrine and the location of disposal site. The difficulty and the disgusting nature of the job contribute to the high cost of providing emptying services. Emptying of full latrines is hazardous, as the emptiers do not use any protective gear. In order to reduce the smell, pit emptiers have developed a local solution of salt, kerosene and lemon juice, which they claim also reduces the liquid contents of the latrines to make it less messy.

Both trained and untrained SIPS use the same manual method for emptying pits, as the conditions of the low-income settlements make it difficult for big desludging trucks to get in. A small suction truck, (vacu-tug) that can negotiate the narrow and unpaved roads in the informal settlements was being trialled in some wards close

to the waste stabilisation ponds. Emptying of full latrines is becoming even more difficult, as the settlements gets more congested making it harder to find space to dig a pit for disposal. Some houses dig a pit in one bedroom to bury waste from a full latrine and then cover and plaster over it. House owners with tyre, drum and some raised brick latrines empty their full pits during the rains by punching a hole at the upper end of the pit or removing the plug over a pre-prepared hole.

The box below shows some field insights into the mechanisms used by SIPS to empty full pits. Detailed field insights are shown in appendix 5.6 with the following codes:

- P 2: *Maboleo b untrained.txt* - 2:82 [Fundi-5] (708:713) (Super) Codes: [latempty]
- P 1: *Dummy fundis.txt* - 1:35 [Fundi] (224:226) (Super) Codes: [latempty]
- P 6: *Frogmen - FGD.txt* - 6:2 [Frogman] (11:16) (Super) Codes: [knowlat] [latempty]
- P 5: *Keko Mwanga Fundi.txt* - 5:35 (318:320) (Super) Codes: [latempty]
- P 7: *trainednot supported (1).txt* - 7:49 [Fundi 6] (403:406) (Super) Codes: [latempty]

Field insight : Pit emptying mechanisms used by SIPS

Case	3
Municipality:	Mixed
Ward:	Mixed
Case description:	Untrained sanitation providers

Quotation

P 6: Frogmen - FGD.txt - 6:2 [Frogman] (11:16) (Super) Codes: [knowlat] [latempty]
Frogman 1: Pit latrines with the pit lined with blocks: this type of latrines is the most preferred by us, people of low income. Emptying is mostly done with this type of latrines, in some cases we break the cover and make a hole, empty the whole waste and transfer it into another pit that is dug beside the full latrine. The new pit can be 10 or 12 ft deep, depending on the size of the full latrine pit. Local emptiers like us use chemicals such as salt and kerosene when emptying.

Frogman 4: Example, for a drum latrine you have to make a hole, but this way only water is discharged and not the excrement, because the hole is often small. There are no more methods other the ones described earlier. This method of making a hole does not require physical power but it is limited to drum latrines only.

4.3.5 Sources of SIPS' skills

Three categories of small independent sanitation providers were identified. The common feature amongst these three groups is that most of them did not attend formal technical training. They all learnt on the job while working with relatives, friends and acquaintances. The groups can be identified as follows:

- *Untrained sanitation providers:* These are groups of latrine builders that have never attended any form of organised training.
- *Trained sanitation providers:* This group has attended training sessions on different latrine technologies often organised by NGOs. After attending the training, they were either used by the agency for the duration of a particular project or go away to continue to work on their own without any further support. This group can also include those that have attended technical colleges. However, SIPS that were trained in technical colleges do not provide services to low-income settlements and were therefore not the focus of this research.
- *Pit emptying service providers:* This group consists of mixed latrine builders and those that solely provide manual pit emptying services. The majority of them have never attended any formal training and also work as manual labourers.

The grouping of SIPS into '*trained* and *untrained*' is as a result of the difference in awareness and skills for various lower-cost latrine options. The trained SIPS know and can build more options when compared to their untrained counterparts. The case studies show that SIPS that have attended training organised by NGOs (EEPSCO, Plan International, WaterAid, and WEPMO), or are working in areas where the NGOs are implementing water and sanitation projects, were aware of more lower-cost latrine options than those who have not attended any training or operate where there are no ongoing projects. For example, only those SIPS that have been trained by NGOs were aware of ecosan, sanplat, and pour-flush latrines.

This section examines how SIPS acquired the skills for building and emptying latrines. Although some of the SIPS in the untrained category attended technical colleges, they were trained in general masonry, which includes the construction of

conventional WC latrines and not the lower cost latrines that are used in the low-income settlements.

The box below describes how SIPS acquired the skills for building and emptying latrines. Detailed case studies are presented in appendix 5.7 with the following codes:

- P 2: Maboaleo b untrained.txt - 2:26 (257:258) (Super) Codes: [SIPS skillsource]*
P 3: paired fundi interview.txt - 3:5 (52:54) (Super) Codes: [SIPS skillsource]
P 4: fundis vingunguti.txt - 4:20 (415:416) (Super) Codes: [SIPS skillsource]
P 9: fundi manzese and tandale (1).txt - 9:15 (253:256)
P10: FUNDIS NO. 7 VETA (2).txt - 10:24 (269:274) (Super) Codes: [SIPS skillsource]
P 5: Keko Mwanga Fundi.txt - 5:18 (145:145) (Super) Codes: [SIPS skillsource]
P 7: trainednot supported (1).txt - 7:16 (153:158) (Super) Codes: [SIPS skillsource]
P 8: fundi's keko Veta (1).txt - 8:27 (415:421) (Super) Codes: [SIPS skillsource]

Case history: Sources of SIPS' latrine construction skills

UNTRAINED SANITATION PROVIDERS

Case 1
Municipality: Temeke
Ward: Mamboleo B
Case description: Untrained sanitation providers

Quotations:

P 2: Maboaleo b untrained.txt - 2:26 (257:258) (Super) Codes: [SIPS skillsource]
Fundi-3: I learnt from a fundi mason whom I worked for as a helper for about 4 years. I used to observe everything. Later on I came out knowledgeable about building a house and latrine because the two are similar. I was observant and the fundi was humble and he liked to see me become a fundi so he started training me. The first day he gave me a trowel and started leading me. I started with building houses, and then a latrine followed after a while.

Case 7
Municipality: Ilala
Ward: Buguruni/Vinvinguti/Mbagala
Case description: Trained sanitation providers

Quotations:

P 7: trainednot supported(1).txt - 7:16 (153:158) (Super) Codes: [SIPS skillsource]
Fundi 10: WEPMO conducted a training workshop on ecosan latrines which I attended. But with other types of latrines; tyre latrines, pit latrines with a pit lined with either blocks or rocks, I learned

to build them through working with other fundis.

Fundi 2: I was trained to build latrines in the streets, but I expanded my knowledge on latrine building after working with Plan International. Plan International gave all fundis who came forward to work with them, the basics on latrines building. That is, how a latrine is built, what is the function of this and that, and what is a good latrine. Plan put much emphasis on pit latrines with a lined pit (VIP).

4.4 Sanitation delivering process

Delivering sanitation services, including installing new latrines and emptying full pits, involves a process of discussion, negotiations and sometimes misunderstanding between a house owner and a small independent provider of sanitation (SIPS). As the name implies, the providers are independent and do not have a regulating or monitoring body and often are of no fixed address making accountability difficult. The process of delivering sanitation services to households can be divided into 4 major steps; *finding new clients, negotiating labour costs and contracting, latrine installation, and pit emptying* (discussed in section 4.3.4 earlier). This session explores the intricate process of delivering household sanitation services by the SIPS. It also tries to highlight the possible impact of this complex process on scaling up and accelerating access to improved basic sanitation in low-income urban communities in Africa.

4.4.1 Finding new clients

SIPS often depend on word of mouth and recommendations from previous clients to find new work. The informal nature of SIPS means that they are unable to advertise their services and therefore rely on recommendations from previous clients or potential clients encountering their work or whilst working on a latrine. Some SIPS (in Keko Mwanga B) were trained and assisted by WaterAid to establish a latrine information centre. The aim was to have a reliable centre where house owners could go to get information on different latrine technologies and also get trained masons who can build their latrines. The box below provides an insight into how SIPS find new clients.

Detailed insight are shown in appendix 5.8 (box 19), with the codes below;

P 1: Dummy fundis.txt - 1:39 (245:251) (Super) Codes: [finding new clients]

P 2: Mableo b untrained.txt - 2:10 [Fundi-7] (95:101)

P 3: paired fundi - 3:31 [Fundi 1] (240:242) (Super) Codes: [finding new clients]

P 4: fundis 1 vingunguti.txt - 4:32 (696:696) (Super) Codes: [finding new clients]

P 9: fundi manzese and tandale (1).txt - 9:37 (476:479)

P10: fundis no. 7 veta txt - 10:103 (1266:1270) (Super) Codes: [finding new clients]

P 5: Keko Mwanga Fundi.txt - 5:96 (1097:1108) (Super) Codes: [finding new clients]

P 7: trainednot supported (1).txt - 7:108 (799:806) (Super) Codes: [finding new clients]

Field insight: Finding new clients

Case 8
Municipality: Ilala
Ward: Buguruni/Vinvinguti/Mbagala
Case description: Trained sanitation providers

Quotations:

P 7: trainednot supported(1).txt - 7:108 (799:806) (Super) Codes: [finding new clients]

Fundi 2: We get orders for work through other fundis, for example a fundi can have extra orders and decides to give some to other fundis. In the past we used to get a lot of orders because we were few, but now we have increased and the number of orders has remained low. Three quarters of orders are obtained through giving orders to one another. Because customers now give orders to fundis they know or are related to them. You are also given a place to work by another fundi because he knows the quality of your work or the customers asked the fundi to contact you after having been impressed by your work in his area. That is why we work in areas outside the ones we live, but we are not fundis specialized on building latrines. You can be called to build a house and after the house has been completed, the owner asks you to build them a latrine.

Fundi 3: They get the information from the people we have built latrines for. A would be customer can approach the owner of a latrine and ask 'who built you this latrine; the owner would say "it is fundi so and so and the cost is this much and the fundi lives in Mbagala." The customer will find the way to Mbagala. When you meet, you would tell him the cost of materials and you can go on to make agreements for you to start work.

4.4.2 Negotiating labour cost and contracting

The 2nd step in the process of delivering sanitation to households is to agree on latrine type, design and labour costs. The decisions about latrine type and design are generally made by the house owner. However, SIPS give advice based on the condition of the site especially where space and funds are limited. As there are no centres to provide reliable information on latrine options and costs, SIPS have to negotiate labour costs with every new client. As a result, the cost of building a particular latrine may vary from one client to another. Labour costs are agreed based on the depth of the pit, soil condition, the population of builders operating in an area, perceived financial status of the house owner and negotiating ability of the SIPS. The cost of labour for the superstructure is negotiated separately. All construction materials are generally purchased by the client. The labour costs are

negotiated for every stage of latrine construction such as pit digging, pit lining and cover slab; superstructure; and roofing. There are no written contracts and most agreements are made orally. This section provides case histories and field insight into the process used by SIPS for negotiating labour costs. Detailed field insights are provided in appendix 5.8 (box 20), codes:

- P 8: fundi's keko Veta (1).txt - 8:55 (720:729) (Super) Codes: [Hh negotiation]*
- P 5: Keko Mwanga Fundi.txt - 5:94 (1075:1084) (Super) Codes: [Hh negotiation]*
- P 9: fundi manzese and tandale (1).txt - 9:44 (521:524) Codes: [Hh negotiation]*
- P 4: fundis vingunguti.txt - 4:57 (1129:1135) (Super) Codes: [Hh negotiation]*
- P 3: paired fundi interview.txt - 3:6 (59:62) (Super) Codes: [decision making]*
- P 2: Maboleo b untrained.txt - 2:123 (982:985) (Super) Codes: [decision making]*

The cost of installing a new latrine can be broken down into four major components; pit digging cost, cost of materials, labour costs for pit lining and construction of super structure. This section provides field insight into how sanitation providers cost the various latrines for their clients. The costs described in this section cover just the labour and do not include construction materials, as they are provided by house owners. Digging a pit of 12ft costs between TZS30,000 – 60,000 and is dependent on the soil condition. Lining and platform construction cost between TZS40,000 – 100,000 depending on the depth. Some field insights into negotiating labour costs and costing latrines are provided in the box below. Detailed insights about latrine costing are shown in appendix 5.8 (box 21), codes:

- P 1: Dummy fundis.txt - 1:22 (148:150) (Super) Codes: [labour cost]*
- P 2: Maboleo b untrained.txt - 2:60 (540:546) (Super) Codes: [labour cost] [latcost]*
- P 3: paired fundi interview.txt - 3:19 (155:159) (Super) Codes: [labour cost]*
- P 4: fundis vingunguti.txt - 4:42 (847:847) (Super) Codes: [labour cost]*
- P 9: fundi manzese and tandale (1).txt – 9:59 (638:641) (Super) Codes: [labour cost]*
- P10: FUNDIS NO. 7 VETA (2).txt - 10:64 (666:667) (Super) Codes: [labour cost]*
- P 5: Keko Mwanga Fundi.txt - 5:54 (458:460) (Super) Codes: [labour cost]*
- P 8: fundi's keko Veta (1).txt - 8:79 (930:930) (Super) Codes: [labour cost]*

Case history: Negotiating labour costs and contracting

Case 4
Municipality: Kinondoni
Ward: Manzese/Tandale
Case description: Trained sanitation providers

Quotations:

P 9: fundi manzese and tandale(1).txt - 9:44 (521:524) Codes: [Hh negotiation]

Fundi 1: You discuss about the work and the type of latrine that he wants. You go to see the site and then you ask him how deep he wants it. You then tell him how many bricks he will need probably about 230 or 240 bricks. So you charge according to the feet and the bricks. You negotiate the price and if you don't agree then he looks for another fundi.

Case 2
Municipality: Temeke
Ward: Mamboleo B
Case description: Untrained sanitation providers

Quotations:

P 2: Mableo b untrained.txt - 2:60 (540:546) (Super)Codes: [labour cost] [latcost]

Fundi-3: About 350 blocks were used, 6 bags of cement for lining. The size was 6ft internal diameter, and 12ft at the top. I cannot estimate the total cost because the owner is the one who was bringing the materials. I would just ask him for the materials that I needed and it would be brought for me. I can help with one thing, as we are all seated here, we can make estimates based on how things really are: 350 blocks; But blocks are sold at different prices from area to area, for example, here In Keko, they are selling at TZS370. And other fundis; Blocks: 350 at TZS400; Cement: 6 bags for lining, the sand is set aside. Sand: 1 lorry at TZS30,000 or 20,000, it is difficult as the prices vary by areas. Let us say that sand to be used for the entire work is TZS20,000 for lining and covering the pit. Logs: 7 at TZS3,500/- each; Gravel: 20 debes (5lit tins) at 1,000/- each; Cement for concrete to cover the pit: 4 bags; Labour charge: this is charged with regard to the time spent and how the fundi and the owner know each other, some charge TZS60,000 to 70,000 or 100,000. The pit is completed, now the superstructure.

4.4.3 Problems encountered by SIPS

The 3rd step in the process of delivering sanitation services is the actual installation of latrines. The majority of the problems associated with the delivery process fall within this step. Many SIPS highlighted the numerous problems that they encounter whilst installing latrines. These include technical problems and relationship with clients particularly with regards to payment. Unstable and poor soil conditions lead to the collapse of pits during construction, which creates

double unpaid work for the SIPS. This often results in misunderstandings between the SIPS and the house owners regarding payments for double digging of pits. Pit collapses have also resulted in serious injuries, sometimes fatal, as the SIPS do not have medical cover. As a result, SIPS charge considerably higher amount for pit excavation and lining to guard themselves against any eventuality.

The high population density and the ensuing congestion of houses contribute to the lack of space for latrines. This leads to pits being dug so close to houses, which weaken the foundation of already poorly constructed houses. The limited space also means that pits are being dug where a latrine was previously located or on old burial sites, unknown to the SIPS. The case histories showed little difference between the problems encountered by untrained SIPS and those encountered by trained SIPS.

This section provides field insight into the experiences of small independent providers of sanitation (SIPS) in the delivery of household sanitation. It explores some of the technical difficulties encountered during latrine construction and relationship with house owners, particularly with payment for labour. The boxes in sections 4.4.3.1 and 4.4.3.2 highlight some of the challenges faced by SIPS in the process of delivering sanitation services to households. Detailed insights are shown in appendix 5.8 (box 22), codes:

P 1: Dummy fundis.txt - 1:43 (295:299) (Super) Codes: [constdiff]

P 2: Maboaleo b untrained.txt - 2:5 (43:51) (Super) Codes: [constdiff]

P 4: fundis vingunguti.txt - 4:17 (374:376) (Super) Codes: [constdiff]

P 9: fundi manzese and tandale (1).txt - 9:75 (779:781) (Super) Codes: [constdiff]

P10: FUNDIS NO. 7 VETA (2).txt - 10:77 (838:840) (Super) Codes: [constdiff]

P 5: Keko Mwanga Fundi.txt - 5:67 (684:686) (Super) Codes: [constdiff]

P 7: trainednot supported (1).txt - 7:4 (50:52) (Super) Codes: [constdiff]

P 8: fundi's keko Veta (1).txt - 8:23 (370:374) (Super) Codes: [constdiff]

4.4.3.1 Technical difficulties

The majority of the informal low-income communities are located in difficult terrains such as marshy land, swamp, abandoned refuse tips or grave yards, flood plains, rocky areas, etc. Building latrines in these soil conditions can sometimes

be challenging due to the instability of the soil, difficulty digging into rocks and the use of basic digging and construction tools by the SIPS.

Field insight: Difficulties encountered with latrine construction

Case 5
Municipality: Temeke
Ward: Keko Mwanga A
Case description: Untrained sanitation providers

P10: FUNDIS NO. 7 VETA (2).txt - 10:77 (838:840) (Super) Codes: [constdiff]

Fundi 1: I dug for 8 feet, but as soon as I started my first round of lining, the wall collapsed, fortunately I jumped out before the wall collapsed completely. You can dig today from the morning to the evening, the pit will collapse a bit and if you measure in the evening, it can be still be twelve feet, and you can plan to start lining the next day. When you come back the next morning, you will not even recognize the place, as the entire pit would have collapsed.

Case 8
Municipality: Temeke
Ward: Keko Magurumbasi (ZamCargo)
Case description: Trained sanitation providers

Quotations:

P 8: fundi's keko Veta(1).txt - 8:23 (370:374) (Super) Codes: [constdiff]

Fundi 1: I was constructing a latrine, which was very close to a house. In many areas, people have small space but want a latrine. On my advice and experience I would dig about ten feet and then put a ladder. Once we started digging a pit and were using rope and bucket to bail out the soil and pass to the person outside. As I got out, the soil covered the pit so we had to dig out the entire soil once more.

Fundi 2: The Cargo area is so congested such that it reached a point where it was hard to dig a pit for a latrine but fortunately now there are the ecosan latrines that you can put up anywhere there is space and many people like it.

4.4.3.2 SIPS' relationship with house owners

The relationship between SIPS and house owners is considered important, as it gives an insight into the complexity of delivering household latrines. Case histories indicate that frictions often arise due to the lack of trust between SIPS and house owners. SIPS are afraid that they will not be paid the agreed amount or even paid at all at the end of the work; while house owners fear that SIPS may abandon their job if they pay them the agreed advances.

Contracts are agreed orally and as a result, there is no written evidence on the amount and payment system agreed by the SIPS and house owners. This often results to problems during payments, as it is their words against one another. As there are no clear regulating bodies or institutions responsible for household sanitation, house owners often get away with not paying SIPS for delivering sanitation services. The lack of systems for certifying authentic SIPS means that fake masons parade themselves as qualified latrine builders and in the process tarnish the image of the others.

The box below gives an insight into the relationship between SIPS and house owners during the installation of latrines. Details of the case histories are presented in appendix 5.9 (box 23), codes:

- P 1: Dummy fundis.txt - 1:47 (334:336) (Super) Codes: [Hhrelation]*
- P 2: Maboleo b untrained.txt - 2:124 (993:996) (Super) Codes: [Hhrelation]*
- P 9: fundi manzese and tandale (1).txt - 9:65 (686:688) (Super) Codes: [Hhrelation]*
- P 5: Keko Mwanga Fundi.txt - 5:70 (737:742) (Super) Codes: [Hhrelation]*
- P 7: trainednot supported (1).txt - 7:133 (958:961) (Super) Codes: [Hhrelation]*

Case history: Relationship with house owners and payment difficulties

Case 4
Municipality: Temeke
Ward: Keko Mwanga B
Case description: Trained sanitation providers

Quotations:

P 5: Keko Mwanga Fundi.txt - 5:70 (737:742) (Super) Codes: [Hhrelation]

Fundi 2: I came across the problems of not being paid for the work I did. In Keko Mwanga it happened in 6 latrines and 3 houses. We made an agreement with the client for example it can be TZS 400,000 or 300,000 for a house. After you have built up to the lintel level, the client can say that he does not have the materials for completing the upper part so you have to stop. You can be asked to stay at home and he will come to tell you when the materials are ready. That will take sometimes more than 2 weeks, and as a mason is just like a prostitute, you will have to look for another place to get a job, and normally it is from sunrise to sunset. When you go back to the former client, you will find that the house you started building has already been completed by another mason so you are not going to be paid for the part of work you did, that's how it goes.

4.5 House owners' knowledge and preferences for latrines

4.5.1 Introduction

The previous section examined and assessed the capacity of small independent providers of household sanitation services. This section examines house owners' knowledge/awareness and experiences of various latrine options. It explores house owners' motivation and constraints to acquiring sanitation services from SIPS. Section 4.5 is divided into five subsections beginning with an introduction; 4.5.2 examines house owners' knowledge and awareness of latrine options; 4.5.3 describes house owners' perceptions and experiences of various latrine technologies; 4.5.4 examines motivations for installing new or improving existing latrines; and 4.5.5 looks at barriers to installing or improving latrines. All sections are presented as case histories, which give field insights into the real situation in the low-income settlements. Information contained in these sections was collected through focus group discussions with house owners (men and women) and tenants from a sample of wards in the three municipalities of Dar es Salaam that make up the study area.

4.5.2 House owners' knowledge & awareness of latrine options

This section explores the level of knowledge and awareness of latrine technologies amongst house owners in low-income urban settlements. The data indicate that house owners seem to have similar levels of awareness of latrine technologies as the SIPS. This is not surprising considering that the majority of household sanitation services are provided by the same SIPS. The latrine technologies range from simple pit latrines to wet latrines. House owners' knowledge or awareness of a particular latrine technology does not necessarily mean that they have used it but may have seen examples in other peoples' houses or institutions. Many houses owners are able to differentiate one type of latrine from another by describing how it functions or the lining materials rather than by name. The majority of the latrines in the low-income settlements are lined due to the unstable soil conditions. The case histories presented in the box below provide an insight into the knowledge and awareness of latrine options amongst house owners. Detailed case histories are shown in appendix 5.10 (box 24), codes:

P 6: FGD mixed landlords improved latrine.txt - 6:149 (152:166) (Super) Codes: [knowledge]

P 8: mixedlandlordimproved latrine.txt - 8:10 (126:129) (Super) Codes: [knowledge]

P12: Landladies with tenants -unimproved latrine.(Super) Codes: [knowledge]

Case history: Knowledge and awareness of latrine options amongst house owners

Case 1
Description: mixed landlords/landladies with improved latrine

Notes:

P 6: FGD mixed landlords improved latrine.txt - 6:149 (152:166) (Super) Codes: [knowledge]

R 1: Most of the latrines which we use or we know here at Keko are local built by bricks, drum or tyres. When someone's latrines pit fills up, is full and he opTZS to dig another pit near your house, you cannot stop him/her as he/she will tell you that "this is my space" and they will go ahead and empty their latrine there, all the smell will now come to you. A normal drum latrine uses drums used for storing diesel and kerosene. You just make a hole on it then you line your pit using up to four drums. When the 1st one fills up, then you to the 2nd, up to the 3rd and if you do not have another space and you get a visitor, you become afraid to tell him where to go and defecate. A tyre latrine uses tyres; you dig the pit and line it with tyre using up to 10 tyres, then you cover the pit and build a super structure but without a roof. Even when the pit fills up, people still continue to use it.

Case 2
Description: mixed landlords/landladies with improved latrine

Notes:

P 8: mixedlandlordimproved latrine.txt - 8:10 (126:129) (Super) Codes: [knowledge]

R 4: Oh yes. The ikolojia one is a bit different. One does not need to dig a different pit at the side for draining sewage water from the latrine. What you do is just channel a pipe to container to collect the urine so that it does not mix with the faeces.

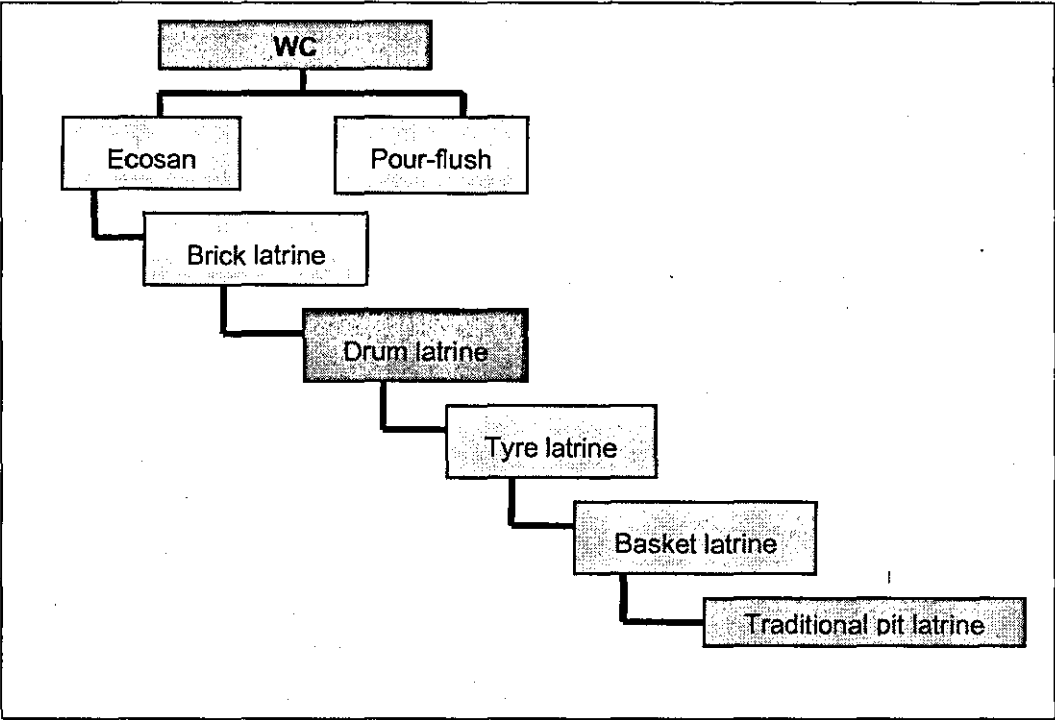
4.5.3 House owners' perceptions and experiences of latrines

This section examines how house owners perceive various latrine technologies based on their attributes. It provides an insight into the key features of latrines that are used in the low-income settlements. Findings from these experiences will contribute to modifying existing latrine technologies to suit house owners' preferences and potentially increase demand and uptake of improved latrines. The data indicate that 'drum' and 'brick' latrines are the most common options in use,

which agrees with SIPS perceptions. Many house owners and tenants, particularly those with drum latrines, are dissatisfied with the performance due to the smell, flies and emptying difficulty. Some of the key attributes that house owners desire in a latrine are stability and durability, easy access for emptying, installation of ceramic squat pan and vent pipe, limited or non-use of water for flushing and no smell.

The figure below portrays a sanitation ladder that describes house owners' perception of the various latrine options.

Figure 7. Sanitation ladder as perceived by house owners



Although many houses use their latrines as bathrooms, house owners' preference will be to have them separate but due to the lack of space, latrines generally combine as bathrooms. Superstructures of most latrines are incomplete and without a roof hence the name 'passport latrine'. This has become the norm and even households that can afford a complete superstructure still go for the passport size. However, some of the users particularly women are dissatisfied with the superstructure due to the limited privacy.

The box below provides some field insight into house owners' perceptions of various latrines. Detailed field insights are presented in appendix 5.10 (box 25), cases:

Case 1: Description: Landladies Keko Mwanga and ZamCargo with mixed latrines

P 4: landlords Keko veta.txt - 4:11 (99:99) (Super) Codes: [Brick]

P 5: landlords manzese.txt - 5:88 (611:613) (Super) Codes: [Latrine super structure]

P 8: mixedlandlordimproved latrine (Super) Codes: [Brick] [Latrine super structure]

P 9: Tenants without landlords (2) (358:361) (Super) Codes: [Latrine quality]

P10: landlords with unimproved latrine (632:633)

Field insight: House owners' perception of latrines in use

Case 2

Description: landlords form Keko Mwanga and ZamCargo with mixed latrines

Notes:

P 4: landlords Keko veta.txt - 4:11 (99:99) (Super) Codes: [Brick]

R 1: I have a normal one, which is a brick one that is twelve feet deep. Most people don't roof (putting the iron sheet) because some don't have the means. I had put iron sheet but the steam from the latrine makes it rust. It didn't even last two years. Most people also take it as a design so if your neighbour has one like that you just copy. Majority of the houses have passport size superstructure, which is where the top half of your body is visible when inside the latrine.

Case 4

Description: mixed landlords/landladies with improved latrine

Notes:

P 8: mixedlandlordimproved latrine (Super) Codes: [Brick] [Latrine super structure]

R 5: Before we go to that, another thing I dislike is the bad smell in the latrine because we don't use disinfectants. I dislike the passport size thing when taking a bath, because only half of your body is covered and the rest can be seen by someone outside. Another thing is when you take a bath; water just flows outside, something that is not good for the environment. It's important to construct a latrine that is complete once you decide to construct one. There is an English saying that says think first before you act, so you have to think first before doing anything.

4.5.4 House owners' motivation for installing/improving their latrines

This section describes some of the factors that motivate house owners to install new or improve their existing latrines. A key motivation for house owners in low-income urban settlement is financial benefits with the potential to attract better rents. Others include: avoiding harassment faced by asking and/or queuing to use

a neighbour's latrine; status symbol especially for those in positions of authority such as local politicians; general human dignity not to be seen defecating openly; privacy; and fear of diseases such as cholera, which occurs regularly in these areas. Finally, the desire to defecate in a clean place, and the smell and disgust of latrines in poor conditions drive many house owners to improve their existing latrines. The general notion is that without a latrine, a house is incomplete, could also be a motivating factor particularly for landlords.

The case histories in the box below describe house owners' motivations for installing latrines with more details presented in appendix 5.10 (box 26), codes:

P 4: landlords Keko veta.txt - 4:11 (99:99) (Super) Codes: [Brick]

P 5: landlords manzese.txt - 5:88 (611:613) (Super) Codes: [Latrine super structure]

P 8: mixedlandlordimproved latrine (Super) Codes: [Brick] [Latrine super structure]

P 9: Tenants without landlords (2) (358:361) (Super) Codes: [Latrine quality]

P10: landlords with unimproved latrine (632:633)

Case history: Motivations for installing latrines

Case 1

Description: Landladies Keko Mwanga and ZamCargo with mixed latrines

Notes:

P 1: Landladies with mixed latrines. txt - 1:49 (210:212) (Super) Codes: [Motivation]

R 1: I decided to improve my latrine because I have tenants. It was not a suitable latrine such that when you go to bath you don't feel clean and my tenants would complain because they pay me and the latrine was not suitable, so I had to build another one.

Case 4

Description: mixed landlords/landladies with improved latrine

Notes:

P 6: FGD mixed landlords improved latrine.txt - 6:154 (320:324) (Super) Codes: [Motivation]

R 2: A house is called a house if it has a latrine, if a house has no latrine it is not complete because if you find a house to rent you first ask if there is a good latrine or not; therefore when you build a house, start with a latrine first and then the house.

4.5.5 Constraints to the installing latrines

Many house owners aspire to better and more hygienic latrines. Some of the factors that prevent them from achieving this include the lack of access to reliable information on affordable 'good' latrines, high cost of known 'good' latrines and

limited space. Others include, difficulty identifying reliable and skilled SIPS. There are neither certification systems nor designated centres to provide SIPS with the knowledge and skills for lower cost improved latrines. House owners have a limited choice of options, as they are dependent on the SIPS knowledge and skills. Information on latrine options and recommendations for latrine builders are often from neighbours, friend and relatives.

This section explores the difficulties encountered by house owners that prevent or delay the installation of new or improvement of existing latrines. The box below contains selection of perceived and actual barriers to installing latrines as were expressed by house owners. Details are presented in appendix 5.10 (box 27) codes:

- P 1: landladies.txt - 1:39 (167:169);*
- P 4: landlords Keko veta.txt - 4:32 (200:202);*
- P 6: FGD mixed landlords improved latrine.txt - 6:52 (443:446);*
- Case: 4 - tenants in houses with absentee landlord and with unimproved latrines;*
- P12: landladies with tenants -unimproved latrine.*

Case history: Barriers to installing improved household latrines

Case 1
Description: landladies Keko Mwanga and ZamCargo with mixed latrines

Notes:

P 1: LANDLADIES.txt - 1:39 (167:169) (Super) Codes: [Emptying difficulty]

R 1: Someone might have a latrine but it is full and he is unable to empty it so that it can be used. Since he can't use it, he will wait for night fall and then uses the neighbour's or dispose his waste in the wrong place.

R 2: It could be that the place is congested so there is no space for putting up a latrine, or maybe in the past he had a latrine that is now full, he is unable to empty.

R 5: There is nowhere to get competent fundi, as it depends on the fundi but they are not good. We don't have a special place. It would be very helpful if the government put a special department, that if you want to build a latrine you can get a fundi there or given instructions on how to build one. Currently there is no information on building 'good' latrines at an affordable cost for people like us, so to save our selves, we do some innovations.

4.6 House owners' experience of acquiring sanitation services

This section examines how households acquire latrines for their houses. It analyses the process from the time they identify a service provider, their experiences with SIPS, the cost of installing latrines, and payment systems. The section is divided into five sub sections; 4.6.1 examines how house owners find SIPS to install or improve their latrines; 4.6.2 describes house owners' experiences with SIPS in the process of acquiring latrines; section 4.6.3 gives an insight into the cost of installing new latrines; 4.6.4 describes payment systems; and 4.6.5 explores the house owners' experiences of emptying full pits.

Each subsection is supported with case histories in boxes that contain extracts from focus group discussions with house owners.

4.6.1 Finding latrine builders (SIPS)

As mentioned earlier on in the chapter, there are no specific places or latrine information centres for finding skilled and reliable SIPS. House owners often rely on recommendations by others who have built latrines or identify them on new construction sites or by seeing samples of their work. Again this agrees with findings from the SIPS about finding new clients. This section gives an insight into how house owners identify SIPS for their latrines, presented in the box below.

Further details are shown in appendix 5.11 (box 28), codes:

P 1: Landladies.txt - 1:35 (156:157) (Super) Codes: [Locating SIPS]

P 4: landlords Keko veta.txt - 4:39 (226:227) (Super) Codes:

Field insight: Finding small independent latrine builders

Case 2

Description: landlords form Keko Mwanga and ZamCargo with mixed latrines

Notes:

P 4: landlords Keko veta.txt - 4:39 (226:227) (Super) Codes:

R 1: It was not difficult it was by word of mouth. I was told that the mafundis in Keko are good. A certain family that lived in my area told me that there is a good fundi in Keko Mwanga, I talked to him and we agreed on TZS75,000 inclusive of cement, timber and ballast.

4.6.2 House owners' experiences with SIPS

This section examines house owners' experiences with SIPS whilst installing latrines in their homes. It looks at some of the difficulties and complexities involved in acquiring sanitation services from SIPS. The case histories indicate a lack of trust for SIPS and also highlight common areas of disagreement between them, which include misuse of construction materials, payment, and pit depth.

The first issue is related to identifying 'real' latrine builders, as there so many bogus ones. It is also difficult to certify which SIPS have the necessary skills for the various latrine options. The lack of specific centres or organizations for SIPS results in the lack of accountability, trust and point of contact in case of problems after latrine installation. Most of the house owners do not trust SIPS and as a result, the process of acquiring latrines has become rather complex. House owners often complain of missing construction materials, especially cement, and SIPS not digging the agreed pit depth. Moreover, SIPS do not provide any warranty; if for example, a latrine breaks down 2 weeks after installation, the responsibility lies with the house owner.

The box below gives examples of house owners' experiences with SIPS and the details are presented in appendix 5.11 (box 29), codes:

P 1: landladies.txt - 1:48 (204:208) (Super) Codes: [Experience with SIPS]

P 3: landladies vingunguti.txt - 3:7 (75:77) (Super) Codes: [Experience with SIPS]

P 4: landlords Keko veta.txt - 4:61 (366:368) (Super) Codes: [Experience with SIPS]

P 5: landlords manzese.txt - 5:36 (305:308) (Super) Codes: [Experience with SIPS]

Case history: House owners experiences with SIPS

Case 2

Description: Landladies with mixed latrines (improved and unimproved)

Notes:

P 3: landladies vingunguti.txt - 3:7 (75:77) (Super) Codes: [Experience with SIPS]

R 1: He will come and you have an agreement with him that he should start working on Monday, he will ask you to give him an advance and when you give him he disappears with your money. The other thing is that many times when you give them some work, he will take the cement you have given him to work. There are many types of fundis some of them cannot take anything even without supervision. If you are not around others will put a lot of sand while making the bricks so the bricks will just crumble and he will defend himself when confronted.

Case 3
Description: Landlords with mixed latrines (improved and unimproved)

Notes:

P 4: landlords Keko veta.txt - 4:61 (366:368) (Super) Codes: [Experience with SIPS]

R 1: You need to follow up on them from beginning to the end because if you don't it might even take two years to complete. You might give him one bag of cement which should produce about forty bricks, you might find that those bricks are just made of sand and this will make it unstable. You have to monitor them from the beginning when they are digging and has laid down the first brick and see how he is doing and if you trust him then it is okay otherwise you might just have a sandy bottom.

4.6.3 Cost of latrines

This section examines how latrines are costed and what house owners pay for their latrines. As there are no standard prices for latrines, the cost depends on the ability of the house owner to negotiate with the SIPS and the amount of work available to the SIPS.

In the 1990s, the cost of building a 'brick' latrine was between TZS125,000 – 150,000. It went up in 2005 to TZS250,000 – 350,000 due to the increased cost of building materials and labour cost. The data on monthly income is presented in in section 4.7 and the follow-up discussion of how this compares the cost of latrine is in section 5.4.2. It is important to note that although costs of latrines go up, house owners' income does not necessarily follow the same pattern and is sort of constant. Many house owners built their 'brick' latrines in stages until they completed half a superstructure described in the earlier sections. The cost of a latrine is broken down for the different stages; there are separate costs for digging pits, lining and platform, superstructure, and roofing.

The cost breakdown for a simple 'brick' latrine is as follows; digging of 10-12ft deep pit (TZS40,000 – 60,000); about 300 bricks for lining (TZS 300 per block = TZS90,000), labour cost for pit lining, completion of platform and half superstructure without roofing (TZS175,000 – 250,000). The majority of the costs of building 'good' latrines (brick latrines) are related to the lining. Unfortunately latrines in most of the study areas need to be lined due to the unstable solid conditions.

The box below outlines some case histories of house owners' experiences of negotiating the cost to pay for their latrines. Details of negotiating price for a latrine are presented in appendix 5.11 (box 30) codes:

P 3: landladies vingunguti.txt - 3:37 (225:230) (Super) Codes: [latrine cost];

P 4: landlords Keko veta.txt - 4:33 (205:209) (Super) Codes: [latrine cost];

P 5: landlords manzese.txt - 5:33 (291:292) (Super) Codes: [latrine cost];

P 8: mixedlandlordimproved latrine.txt - 8:36 (497:507) (Super) Codes: [latrine cost].

Case history: Costs of installing latrines

Case 1

Description: Landladies with mixed latrines (improved and unimproved)

Notes:

P 3: landladies vingunguti.txt - 3:37 (225:230) (Super) Codes: [latrine cost]

R 2: Digging a 10ft deep pit cost about TZS50, 000 and not inclusive of the cost of bricks and sand. So in total, it is expensive to line the pits and the super structure is even a different cost. There is a different cost for breaking the bricks and for water. It is different for everything.

Case 4

Description: mixed landlords improved latrine

Notes:

P 8: mixedlandlordimproved latrine.txt - 8:36 (497:507) (Super) Codes: [latrine cost]

R 1: I first had to do away with the existing latrine. This cost me about twenty two thousand shillings. Then I had to prepare bricks for the new pit, which cost me about TZS200, 000 on average. Like I said before, money was a problem, so I used the money in instalments. Whenever I got paid, I called a fundi and so on until the work was completed.

4.6.4 Payment systems

Many house owners pay for their new latrines in instalments in cash and the amount depends on the agreement with the SIPS. Due to house owners' experiences with SIPS, agreement is often reached to pay in three instalments, at the beginning, halfway through and after completion. Some house owners agree to pay a small percentage every day until the work is completed. Paying in instalments enables the house owners to gather money together for the next payments and also gives the SIPS some motivation to continue until the latrine is completed. Payment is sometimes inclusive of lunch, and if agreed at the onset, the house owner will provide lunch throughout the construction. The box below describes some of the payment systems used by house owners in the study areas. Detailed field insights are provided in appendix 5.11 (box 31), codes:

- P 3: *landladies vingunguti.txt* - 3:68 (376:380);
- P 4: *landlords Keko veta.txt* - 4:85 (431:432);
- P 5: *landlords manzese.txt* - 5:32 (289:289).

Case histories: Payment systems

Case1

Description:Landladies with mixed latrines (improved and unimproved)

Notes:

P 3: *landladies vingunguti.txt* - 3:68 (376:380) (Super) Codes: [Payment]

R 1: The procedure depends on the agreement, a fundi might ask for you to pay him an advance. If you have agreed TZS300, 000, you cannot give him the whole amount at a go. You can pay him in two or three instalments; it depends on what he wants or what you want. You might give another one some money and he disappears without finishing your work. I paid in instalments I didn't pay him the whole amount.

R 4: In most cases, with the fundis in the estates, you agree and pay him a quarter of the whole sum, you can hold the rest intentionally until he finishes. If he doesn't finish you don't pay him. He won't agree to build and be paid at the completion of the job. We understand and know how we hire fundis in the estates.

4.6.5 House owners' experiences of emptying full latrines

Emptying full pits is one of the biggest barriers to increasing access to improved latrines in low-income urban settlements, which is compounded by the lack of allocated areas for disposing of the sludge. Space is a big issue and often house owners are unable to build a new toilet. In some cases where space is very limited, pits are dug in bedrooms and covered afterwards. Cheaper options such as the drum and tyre latrines cannot be emptied so households are forced to use neighbours' latrines or revert back to defecating openly. The lack of access roads and the nature of the pit contents make it impossible for desludging trucks to provide emptying services. Most of the pit emptying is done manually using basic tools.

This section examines the experiences of house owners with emptying full pits. The box below gives some field insight into emptying mechanisms with the details presented in appendix 5.11 (box 32), codes:

- P 1: *Landladies.txt* - 1:39 (167:169) (Super) Codes: [Emptying difficulty]

- P 4: landlords Keko veta.txt - 4:125 (665:670) (Super) Codes: [Emptying difficulty]*
- P 6: mixed landlords improved latrine.txt - 6:16 (136:138) Codes: [Emptying difficulty]*
- P 8: mixedlandlordimproved latrine.txt - 8:48 (543:547) (Super) Codes: [Emptying difficulty]*
- P10: landlords with unimproved latrine.txt - (581:583) (Super) Codes: [Emptying difficulty]*
- P12: Landladies with tenants/unimproved latrine (258:266) Codes [Emptying difficulty]*

Field insight: Emptying full pit latrines

Case 1
Description: Landladies with mixed latrines (improved and unimproved)

Notes:

P 1: Landladies.txt - 1:39 (167:169) (Super) Codes: [Emptying difficulty]

R 2: Some are not able, the latrine is full and they cannot empty it, as a fundi will ask for a hundred thousand shillings. (TZS.100, 000). I didn't have any problems but my neighbour died when trying to empty his latrine.

Case 2
Description: Landlords with mixed latrines (improved and unimproved)

Notes:

P 4: landlords Keko veta.txt - 4:125 (665:670) (Super) Codes: [Emptying difficulty]

R 2: I once got the emptying truck, it emptied but not completely because of the type of sludge, and I had paid. I had to get a second vehicle, which broke down so I had to break my latrine and dig the contents out into another pit, it is much better.

Part B: Quantitative analysis

4.7 House owners' background

The qualitative data provided some information about the characteristics of the population in the low-income settlements where the studies were conducted. The objective of the quantitative data analysis is to support the qualitative information. It provides more validity to the findings by triangulating information collected using qualitative methods. This section presents background information of the sampled population. The 427 respondents consist of male house owners (Landlords) and female house owners (Landladies).

Table 15 summarises the information on house owners' gender and monthly income. The results indicate that there are more landlords (78%) than landladies (22%). Monthly income was similar across gender until it gets to the income level of 41,000 – 59,000, where the percentage of landladies in this category was significantly less than the landlords. Although there is a general perception in the low-income settlements that men earn higher monthly income than women, the 'percentages within gender' 21.8% and 13.5% (>40 - <60) are not sufficiently large enough to indicate that there is a relationship between income and gender.

Table 15. House owner income in thousands and Gender Crosstabulation				
Monthly Income in thousands (TZS*)		Gender		Total
		Female	Male	
<20	Count	25	65	90
	% within Gender	28.1	20.3	
	% of Total	6.1	15.9	22.0
20 – 40	Count	31	98	129
	% within Gender	35.8	30.5	
	% of Total	7.6	23.9	31.5
>40 - <60	Count	12	70	82
	% within Gender	13.5	21.8	
	% of Total	2.9	17.1	20.0
>60	Count	21	88	109
	% within Gender	23.6	27.4	
	% of Total	5.1	21.4	26.5
Total	Count	89	321	410
	% within Gender	100.0	100.0	
	% of Total	21.7	78.3	100.0

*Tanzania shillings (TZS1000 = \$USD1)

Note: Crosstabulation represents column percentages and does not show row percentages.

χ^2 5.16 NS, $p > .05$.

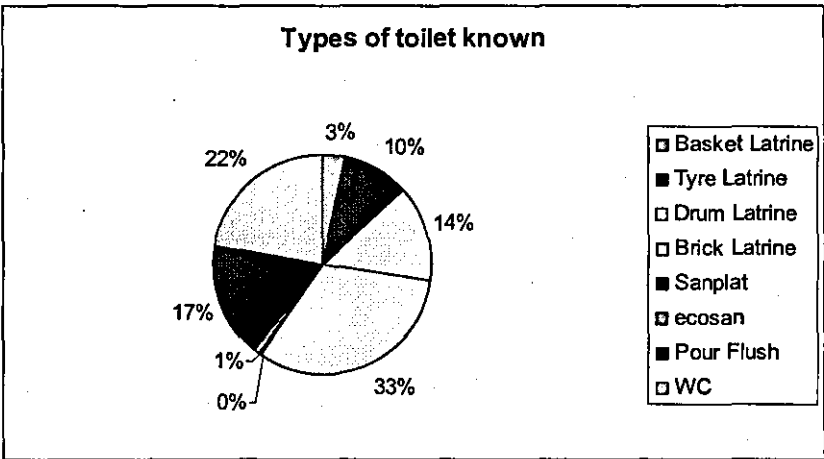
The calculated chi-square value 5.16 at three degrees of freedom and the significance level of 0.16 suggests that there is no relationship between Gender and monthly income in total.

4.8 House owners' knowledge of latrine technologies

As mentioned in section 4.5.2, house owners' knowledge of latrine technologies is similar to those of small independent providers. The majority of the latrines known to house owners are various options of the pit technology, with the 'brick' latrine being the most widely known and the most common, (see figure 6).

Over 97% of the respondents think that the brick latrine is the most common option in their areas, and also ranked it as in the good and best category. The latrines were ranked according to house owners' perceptions based on durability, aesthetics, ease of cleaning, and emptying potential. Very few house owners ranked ecosan and pour-flush, because they were newly introduced and people were not yet familiar with these technologies. '

Figure 8. Latrine technologies and options known



Brick' latrine is the aspiration for many residents of the low-income settlement. When asked why 'brick latrine' is ranked as being very good, the majority indicated that it is durable, lasts longer and easier to empty. Many house owners start with a simple 'drum latrine' and save up money to build a brick latrine. Those who are

economically more successful install a squat pan (without water seal). House owners' preferences are examined in detail in the next section.

4.8.1 Types of latrines in use

This section examines the types of latrines installed by house owners, motivations for installing these particular latrines, and key attributes that house owners want for their latrines. The relationship between types of latrine and sex of the house owner are also examined in this section. Table 16 shows the cumulative responses to the question, 'what type of latrine do you have and use in your house?' The results indicate that 80% of the respondents have and use 'brick latrines'. The table shows that there is no significant difference between ownership of the various latrine technologies across gender. Brick latrines are the most widely owned latrines; landladies (82%) and landlords (80%). The results support earlier findings indicating using qualitative method that brick latrines are the most common and also the best ranked technology by house owners.

Lower costs and durability were the main reasons given for the choice of brick latrine by house owners as indicated in table 16. There were no significant difference for the choice of brick latrines amongst landladies and landlords.

Although the brick latrine is high up in the sanitation ladder, house owners still consider it lower cost when compared to pour-flush and WC latrines. The last two latrine options do not only have high installation cost but it also has high maintenance cost, as they both require water to operate.

Table 16. Types of latrine in use in the homes by gender

Latrines in use(a)		Gender		Total
		Female	Male	
Basket Latrine	Count	1	1	2
	% within Sex	1.1	0.3	
	% of Total	0.2	0.2	0.4
Tyre Latrine	Count	1	5	6
	% within Sex	1.1	1.5	
	% of Total	0.2	1.3	1.5
Drum Latrine	Count	1	9	10
	% within Sex	1.1	2.8	
	% of Total	0.2	2.2	2.4
Brick Latrine	Count	73	260	333
	% within Sex	81.1	79.8	
	% of Total	17.5	62.4	79.9

Sanplat (Sungura)	Count	1	0	1
	% within Sex	1.1	0.0	
	% of Total	0.2	0.0	.2
Pour-flush	Count	6	35	41
	% within Sex	6.7	10.7	
	% of Total	1.4	8.4	9.8
WC	Count	7	17	24
	% within Sex	7.8	5.2	
	% of Total	1.7	4.1	5.8
Total	Count	90	327	417
	% of Total	21.4	78.6	100.0

Crosstabulation represents column percentages and totals are based on respondents.

a Dichotomy group tabulated at value 1.

A key feature that house owners' desire is the ability to combine their latrines with a shower. Results indicate that 56% of house owners use their latrines as bathrooms with no significant difference between landladies and landlords. The main reasons given were limited space and cost saving. A few house owners raised their latrines above ground level, particularly those in lowland that is prone to flooding. Most latrines are located within the yard where there is space, or otherwise outside. The majority of house owners (75%) prefer to locate latrines inside the yard, as they can monitor who uses the latrine. They indicated that latrines located outside the houses are prone to use and abuse by neighbours and residents, and they fill up more quickly. Only a few house owners (7%) with WC or pour-flush latrines locate them inside the houses. These latrines are used by the house owner, his immediate family members and special visitors. Other residents of the house often use a brick latrine located within the yard. The preferred location of the latrine is an important factor when considering latrine designs if house owners are to be motivated to install hygienic latrines.

4.8.2 Sources of latrine information

In order to accelerate and upscale access to hygienic latrines, it was deemed necessary to understand where house owners go for information when deciding to install a latrine. Results of the multiple response crosstabulation in Table 17 suggest that house owners mainly get information about latrine options from neighbours (38.4%) and from friends/relatives (43.6%). The results also suggest

that there is no significant difference between sources of information for landladies and landlords respectively.

Table 17. Sources of information on latrine by gender				
Latrine information source(a)		Gender		Total
		Female	Male	
latrine info source neighbours	Count	34	154	188
	% within Sex	34.3	39.5	
	% of Total	7.0	31.5	38.4
latrine info source friends/relatives	Count	52	161	213
	% within Sex	52.5	41.3	
	% of Total	10.6	32.9	43.6
latrine info source institutions	Count	4	30	34
	% within Sex	4.0	7.7	
	% of Total	0.8	6.1	7.0
latrine info source worship	Count	2	3	5
	% within Sex	2.0	0.8	
	% of Total	0.4	0.6	1.0
latrine info source work place	Count	4	18	22
	% within Sex	4.0	4.6	
	% of Total	0.8	3.7	4.5
latrine info source Bar/hotel	Count	0	5	5
	% within Sex	0.0	1.3	
	% of Total	0.0	1.0	1.0
latrine info source Others	Count	3	19	22
	% within Sex	3.0	5.9	
	% of Total	0.6	3.9	4.5
Total	Count	99	390	489
	% of Total	20.2	79.8	100.0

Crosstabulation represents column percentages and totals are based on respondents.

a Dichotomy group tabulated at value 1.

4.9 House owners' experiences of acquiring sanitation

4.9.1 Background

This section examines the experiences of house owners with acquiring sanitation services from SIPS. It assesses the process of installing and maintaining latrines from identifying SIPS to emptying full latrines. The process that house owners go through to acquire a new latrine or empty a full one seems complex and constitutes one of the major barriers to increasing access to hygienic latrines. Results in the subsequent sections examine these processes in detail. For clarity purposes, the process has been divided into three phases, negotiations; installation of new latrines; emptying; and renovation of existing latrines.

4.9.2 Phase 1: Identification of latrine builders and negotiation

The initial step towards installing a new latrine is to choose the latrine. As mentioned in section 4.8.2, there are no reliable centres for information on latrine technologies. House owners get information about latrines from neighbours, friends and relatives or when they see a latrine being built. Once the choice of latrine has been made, the next step is to identify a latrine builder.

Results in table 18 show that latrine builders are selected based on recommendations by neighbours (37%) and friends/relatives (23%). House owners also identify latrine builders, whilst they are building for others (20%). Again, there are no reliable locations for identifying latrine builders especially those that provide services for low-income settlements. The majority of the latrine builders are small independent persons often with no known address hence the house owners go by recommendations from others. The inability to find reliable and skilled latrine builders contributes significantly to the poor access to hygienic latrines in low-income settlements.

Table 18. Sources of latrine builder by gender crosstabulation				
Sources of latrine builders (a)		Gender		Total
		Female	Male	
Neighbours	Count	35	116	151
	% within Sex	39.3	34.1	
	% of Total	8.2	27.0	35.2
Recommendation from friends/relatives	Count	28	104	132
	% within Sex	31.5	30.6	
	% of Total	6.5	24.2	30.8
Latrine building site	Count	15	68	83
	% within Sex	16.9	20.0	
	% of Total	3.5	15.9	19.3
Places of worship	Count	1	2	3
	% within Sex	1.1	0.6	
	% of Total	0.2	0.5	0.7
Places of work	Count	4	16	20
	% within Sex	4.5	4.7	
	% of Total	1.0	3.7	4.7
Self (owner/mason)	Count	6	34	40
	% within Sex	7.0	10.5	
	% of Total	1.4	7.9	9.3
Total	Count	89	340	429
	% of Total	20.9	79.1	100.0

Crosstabulation represents column percentages and totals are based on respondents.

a Dichotomy group tabulated at value 1.

The next step after identifying a latrine builder is to begin negotiations. The house owner informs the builder of the type of latrine he has chosen to build and shows him the site. They discuss the type and quantity of materials required based on the type of latrine. For the more permanent brick latrine, the negotiations sometimes include block making if the owner has not prepared the blocks already. During negotiations, agreement is reached on labour cost, provision of construction materials, payment systems, construction phases and time. Results show that 63% of house owners finalise agreement with latrine builders in more than one meeting. The reason often given for meeting more than once with a latrine builder is the inability of both parties to agree on labour cost or incomplete construction materials.

The final agreement is often done orally with no witnesses by landladies and landlords respectively as is shown in Table 19. The crosstabulation suggests that the method of final agreement is independent of gender. The lack of written agreement or oral agreements without a third party often results in difficulties when one party fails in his obligation.

Table 19. Type of contract by gender				
Oral agreement (without witness)		Gender		Total
		Female	Male	
No	Count	16	58	74
	% within Gender	17.8	17.6	17.7
	% of Total	3.8	13.8	17.7
Yes	Count	74	271	345
	% within Gender	82.2	82.4	82.3
	% of Total	17.7	64.7	82.3
Total	Count	90	329	419
	% within Gender	100.0	100.0	100.0
	% of Total	21.5	78.5	100.0

Crosstabulation represents column percentages and totals.
Cramer's V (value) = .002

According to the house owners, labour costs are negotiated in three main parts; pit digging, pit lining and platform, and superstructure. The cost for installing a superstructure is further divided into 2, depending on the height (3ft or 6ft) and if it will be roofed.

Table 20. Labour cost by gender

Labour cost(a)		Gender		Total
		Female	Male	
Cost <20,000	Count	13	34	47
	% within Sex	16.3	12.5	
	% of Total	3.7	9.7	13.4
Cost 20,000 - 50,000	Count	41	113	154
	% within Sex	51.3	41.5	
	% of Total	11.6	32.1	43.7
Cost >50,000	Count	26	125	151
	% within Sex	32.5	46.0	
	% of Total	7.4	35.5	42.9
Total	Count	80	272	352
	% of Total	22.7	77.3	100.0

Percentages and totals are based on respondents and it does not include those that paid no labour cost
a Dichotomy group tabulated at value 1.

Results in Table 20 show that 43% of house owners paid more than TZS50,000 in labour costs for pit lining (depends on depth) and platform completion. The table does not show labour costs for pit digging and superstructure. It also suggests that there is a relationship between gender and cost of labour with women paying slightly less than their male counterparts. This disputes the perception by landlords that they receive poorer treatment from SIPS and charged higher fees than the landlords.

However when labour costs are compared to the types of latrines in use, there appears to be some relationship. Table 4.10 shows a relationship between the type of latrine in use and the cost of labour. The results suggest that labour costs increase as the quality of latrine increases. The latrines that are perceived to be of good quality also cost more to install. Earlier results showed that the brick latrine is the most widely used and trusted option in the low-income settlements. The result in Table 21 show that house owners (55.2%) pay more to install brick latrines than the temporary latrines such as basket, tyre and drum latrines. This result indicates that any technology with similar attributes to the brick latrine, (durability, easier access for emptying, potential to upgrade to a pour-flush, easier to clean and maintain) is more likely to motivate house owners to install a hygienic latrine or upgrade existing ones.

Table 21. Labour cost by latrine in use

Labour cost(a)		Latrine in use(a)						Total
		Tyre latrine	Drum latrine	Brick latrine	Sanplat (Sungura)	Pour-flush	WC	
<20,000	Count	1	2	39	0	3	0	45
	% column	33.3	28.6	13.4	0.0	9.1	0.0	
	% of Total	0.3	0.6	11.0	0.0	.8	0.0	12.1
20,000 - 50,000	Count	2	4	90	0	7	8	113
	% column	66.7	57.1	30.8	0.0	21.2	40.0	
	% of Total	0.6	1.1	25.4	0.0	2.0	2.3	31.4
>50,000	Count	0	1	163	1	23	12	200
	% column	0.0	14.3	55.2	100.0	69.7	60.0	
	% of Total	0.0	0.3	46.0	0.3	6.5	3.3	56.5
Total	Count	3	7	292	1	33	20	354
	% of Total	0.8	2.0	82	0.2	9	6	100.0

Percentages and totals are based on respondents.

a Dichotomy group tabulated at value 1.

4.9.3 Phase 2: Latrine construction process

Some house owners have breaks at various stages of latrine construction. The reasons given for this include lack of funds, incomplete construction materials or the latrine builder not turning up. The stage at which a latrine in low-income settlements is considered to be complete is debatable.

Table 22. Reasons for gaps in latrine installation by gender

Why build in phases(a)		Gender		Total
		Female	Male	
Shortage of funds	Count	14	54	68
	% within Sex	87.5	81.8	
	% of Total	17.1	65.9	83.0
Ran out of materials	Count	0	4	4
	% within Sex	0.0	6.1	
	% of Total	0.0	5.9	5.9
Builder left	Count	0	2	2
	% within Sex	0.0	3.0	
	% of Total	0.0	2.4	2.4
Others	Count	2	6	8
	% within Sex	12.5	9.1	
	% of Total	2.4	7.3	9.7
Total	Count	16	66	80
	% of Total	19.5	80.5	100.0

Percentages and totals are based on respondents.

a Dichotomy group tabulated at value 1.

Many of the latrines in the study areas had half completed superstructure without roof (known as 'passport' latrine), which the owners consider complete. Results suggest that house owners consider phased latrine installation, when it has not been completed at a stretch from pit up to the 'passport' superstructure. Table 22 suggests that out of the 82 house owners that indicated having breaks, 83% attributed this to shortage of funds. Crosstabulation suggests no relationship between gender and gaps in installation. House owners often spend money earmarked for a latrine on other pressing issues in the family such as hospital and drugs bills, school fees and food. The continuous rise in the cost of construction materials also contributes to the shortage of funds. As a result, house owners are unable to pay the latrine builders as agreed or buy the lacking construction materials.

The time taken to complete a latrine is dependent on many factors including the type of latrine, soil condition, availability of materials and funds, reliability of the builder and, last but not the least, the number of SIPS working on the latrine. Results of the multiple frequency distribution show that 93% of the respondents completed their latrines in less than three months and only very few (1%) took more than six months to complete.

Table 23. Construction time by gender				
Construction time(a)		Gender		Total
		Female	Male	
<3 months	Count	86	304	390
	% within Sex	95.6	92.4	
	% of Total	20.5	72.6	93.1
3-6 months	Count	4	20	24
	% within Sex	4.4	6.1	
	% of Total	1.0	5.8	5.7
>6 months	Count	0	5	5
	% within Sex	0.0	1.5	
	% of Total	0.0	1.2	1.2
Total	Count	90	329	419
	% of Total	21.5	78.5	100.0

Percentages and totals are based on respondents.
a Dichotomy group tabulated at value 1.

The crosstabulation analysis (Table 23) for construction and gender suggests no significant difference for the construction category of less than three months. However, a difference begins to appear from the 3-6 months category where there

are 6.1% of landlords compared to 4.4% of landladies. Although the percentage of landlords in the more than six months category is negligible at 1%, it is important to note that there were no landladies in this category. This could mean that landladies who decide to install a latrine, plan and prepare all the necessary materials and funds to see the work through in a short time period. Builders may also be warier of abandoning female clients' work as the consequences could mean losing future clients, as landladies are more likely to spread the name of unreliable builders.

The results in table 24 suggest that all lower cost latrines were completed in less than three months. The brick latrine, which is perceived to be cheapest of the best latrines, had 22 house owners that completed in 3-6 months and 4 that completed in more than 6 months. The data suggest some relation between the type of latrine and the time taken to complete the installation. House owners that go for basket, tyre and drum latrines are often able to complete them within a short period due to the low cost of materials required and the shallow depth of the pits.

Table 24. Time taken to construct latrines					
Latrines in use(a)		Construction time(a)			Total
		<3months	3-6 months	>6 months	
Basket Latrine	Count	2	0	0	2
	% Column	0.5	0.0	0.0	
	% of Total	0.5	0.0	0.0	0.5
Tyre Latrine	Count	8	0	0	8
	% Column	2.0	0.0	0.0	
	% of Total	1.9	0.0	0.0	1.9
Drum Latrine	Count	10	0	0	10
	% Column	2.5	0.0	0.0	
	% of Total	2.4	0.0	0.0	2.4
Brick Latrine	Count	313	22	4	339
	% Column	79.0	91.7	80.0	
	% of Total	73.6	5.2	0.9	79.7
Sanplat (Sungura)	Count	1	0	0	1
	% Column	0.3	0.0	0.0	
	% of Total	0.2	0.0	0.0	0.2
Pour-flush	Count	38	2	1	41
	% Column	9.6	8.3	20.0	
	% of Total	8.9	0.5	0.2	9.6
WC	Count	24	0	0	24
	% Column	6.1	0.0	0.0	

	% of Total	5.7	0.0	0.0	5.7
Total	Count	396	24	5	425
	% of Total	93.1	5.7	1.2	100.0

Percentages and totals are based on respondents.

a Dichotomy group tabulated at value 1.

As mentioned earlier in the qualitative analysis section, all latrine builders trained or learnt general masonry, and only a handful attended specially organised training on low-cost latrine construction. Latrine builders often work in pairs, with one being the main builder and the other a helper/trainee or another mason. The crosstabulation in Table 25 above shows the number of builders that worked on any one latrine by gender according to house owners. Results show that 82% of house owners mentioned that there was more than one person at any one time building their latrine. The results show no relationship between gender and the number of builders per latrine.

Table 25. Number of builders per latrine by gender				
Number of builders(a)		Gender		Total
		Female	Male	Female
1 builder	Count	14	52	66
	% within Sex	17.1	18.4	
	% of Total	3.8	14.2	18.1
>1 builder	Count	68	231	299
	% within Sex	82.9	81.6	
	% of Total	18.6	63.3	81.9
Total	Count	82	283	365
	% of Total	22.5	77.5	100.0

Percentages and totals are based on respondents.

a Dichotomy group tabulated at value 1.

The final part in the process of installing a new latrine is the payment of builders for their labour and sometimes material costs. Payment agreements include the total amount and the system of payment is made at the beginning of negotiations. Sometimes house owners fail to fulfil the agreement for various reasons which brings disagreement. Other areas of disagreement include insufficient construction materials, builders not turning up for work (have more than one job at a go), resulting in extended construction time. Table 26 shows areas of disagreement between house owners and builders during the latrine installation period. The

results indicate that only a few house owners (48) mentioned that they had disagreement with the builders, which disputes what the builders said in the qualitative section. The current result shows that the majority of the disagreements are related to labour costs and payment systems.

Table 26. Disagreements with latrine builders by gender				
Types of disagreement (a)		Gender		Total
		Female	Male	
Labour cost	Count	3	24	27
	% within Sex	37.5	58.5	
	% of Total	6.1	49.2	55.3
Payment system	Count	3	8	11
	% within Sex	37.5	19.5	
	% of Total	6.1	16.3	22.4
Quantity of materials	Count	0	3	3
	% within Sex	0.0	7.3	
	% of Total	0.0	6.1	6.1
Supply of material	Count	1	2	3
	% within Sex	12.5	5.9	
	% of Total	2.0	4.1	6.1
Completion time	Count	1	2	3
	% within Sex	12.5	5.9	
	% of Total	2.0	4.1	6.1
Latrine builder left	Count	0	1	1
	% within Sex	0.0	2.4	
	% of Total	0.0	2.0	2.0
Others	Count	0	1	1
	% within Sex	0.0	2.4	
	% of Total	0.0	2.0	2.0
Total	Count	8	40	48
	% of Total	16.2	83.8	100.0%

Percentages and totals are based on respondents.

a Dichotomy group tabulated at value 1.

4.9.4 Phase 3: Emptying and renovating existing latrine

Emptying of full latrines in the low-income settlements is often done manually due to the lack of access for mechanical trucks, semi-solid nature of the sludge, and high cost of mechanical emptying amongst others. This section examines house owners' experiences of emptying full latrines. As mentioned earlier in the qualitative analysis sections, many house owners have improvised ways of emptying their latrines during the rains. Latrine builders are asked to leave a hole

in the walls of the pit towards the top. The hole is plugged until sludge reaches that level and it is open during the rain and discharged with storm water into the open.

Results of the frequency distribution indicate that 45.5% of house owners have emptied their latrines at least once. Table 27 shows a crosstabulation of the different types of latrines in use by the number of times they have been emptied. The results show that brick latrines have been emptied more than any other latrine option. This result is justified considering that the brick latrine is the most commonly owned latrine in the study area. Of the 339 brick latrines, 25% have been emptied once and 19% more than once. Although there are very few basket, tyre and drum latrines in use, they seem to be emptied more frequently than the other options mainly as a result of the shallow depth of the pits.

Table 27. Number of times emptied by type of latrine					
Latrines in use(a)		Number of times emptied(a)			Total
		once	> once	never	
Basket Latrine	Count	0	1	1	2
	% Row	0.0	50.0%	50.0%	
	% of Total	0.0	.2%	.2%	.4%
Tyre Latrine	Count	0	6	2	8
	% Row	0.0	75.0%	25.0%	
	% of Total	0.0	1.4%	.5%	1.9%
Drum Latrine	Count	2	5	3	10
	% Row	20.0	50.0%	30.0%	
	% of Total	0.5	1.2%	.7%	2.4%
Brick Latrine	Count	85	63	191	339
	% Row	25.1	18.6%	56.3%	
	% of Total	20.1	15.9%	45.9%	79.8%
Sanplat (Sungura)	Count	1	0	0	1
	% Row	100.0%	.0%	.0%	
	% of Total	.2%	.0%	.0%	.2%
Pour-flush	Count	4	8	29	41
	% Row	9.8%	19.5%	70.7%	
	% of Total	.9%	1.9%	6.8%	9.6%
WC	Count	6	7	11	24
	% Row	25.0%	29.2%	45.8%	
	% of Total	1.4%	1.7%	2.6%	5.7%
Total	Count	98	90	237	425
	% of Total	23%	21.2%	55.8%	100.0%

Percentages and totals are based on respondents.

a Dichotomy group tabulated at value 1.

The age of a latrine is another factor that accounts for the number of times it has been emptied. Results in Table 28 shows that there is a relationship between the age of a latrine and the number of times it has been emptied. Of the 99 latrines that have been emptied once, 0.2% are less than one year old and of the 91 latrines that have been emptied more than once, only 1% are less than a year old. These new latrines that have been emptied more than once could be the temporary shallower options such the tyre and drum latrines. However, as the age of the latrine increases, the number of times that it has been emptied also increases, as is evident for latrines more than six years old.

Table 28. Number of times emptied by age of latrine					
Latrine age(a)		Number of times emptied(a)			Total
		once	> once	never	
latrine age <1yr	Count	1	4	16	21
	% Row	1.0	4.4	6.8	
	% of Total	0.2	0.9	3.7	5.9
latrine age 1-3yrs	Count	9	5	37	51
	% Row	9.1	5.5	15.6	
	% of Total	2.1	1.2	8.7	11.9
latrine age >3yrs - 6yrs	Count	17	12	72	101
	% Row	17.2	13.2	30.4	
	% of Total	4.0	2.8	16.9	23.7
latrine age >6yrs	Count	72	70	112	254
	% Row	72.7	76.9	47.3	
	% of Total	16.9	16.4	26.2	59.5
Total	Count	99	91	237	427
	% of Total	23.2	21.3	55.5	100.0

Percentages and totals are based on respondents.

a Dichotomy group tabulated at value 1.

Emptying of full pits is often done manually in the low-income settlements by service providers commonly known as 'frog men'. Emptying services providers use simple implements such as spades, buckets and ropes without protective coverings. Prior to opening, the platform is destroyed to enable access to the pit, which contributes to the high cost of emptying. The lack of suitable access makes it impossible for big emptying trucks to provide services to low-income settlements. Furthermore, it is difficult for trucks to desludge the pit contents, without using large quantities of water first.

The cost of emptying ranges from TZS40, 000 to over TZS60, 000 excluding the cost of renovating parts of the pit lining and the platform. Table 29 shows a crosstabulation of emptying by method. The results show that the cost of emptying increases as the methods used advance. House owners who empty their own latrines pay nothing while those that employ the services of a 'frog man' pay up to TZS60, 000. In some low-income settlements where access allows for the use of big trucks, emptying costs go up to above TZS60, 000. In a few settlements located close to the waste stabilisation ponds, an NGO was field testing the use of a small emptying truck (vacu-tug) to try to negotiate the narrow lanes. Although the use of this type of small truck makes pit emptying more hygienic, house owners complain that they do not empty the entire pit contents; as a result, people still prefer manual emptying.

Table 29. Emptying cost by service provider						
Who emptied(a)		Emptying cost(a)				Total
		none	<40,000	40,000 - 60,000	>60,000	
Myself/family member	Count	20	0	0	0	20
	% Row	100.0	0.0	0.0	0.0	
	% of Total	100.0	0.0	0.0	0.0	100.0
Fundi	Count	0	48	69	11	128
	% Row	0.0	37.5	54.0	8.6	
	% of Total	0.0	25.1	36.1	5.8	67
Small truck	Count	0	3	12	2	17
	% Row	0.0	17.6	70.6	11.8	
	% of Total	0.0	1.60	6.3	1.0	8.9%
Big truck	Count	0	0	2	24	26
	% Row	0.0	0.0	7.7	92.3	
	% of Total	0.0	0.0	1.0	12.6	13.6
Total	Count	20	51	83	37	191
	% of Total	10.5	26.7%	43.4	19.4	100.0

Percentages and totals are based on respondents.

a Dichotomy group tabulated at value 1.

One of the key contributing factors to the presence of unhygienic latrines in the low-income settlements is the difficulty and high cost of emptying full pits. The limited choice of latrine options that provide easier access for emptying and the lack of disposal sites close the settlements makes access to hygienic latrines even

more difficult. Sludge from latrines is emptied in shallow pits dug next to the existing latrine if there is space. In some cases, house owners who lack space are forced to dig a pit in one of the bedrooms, which is filled and renovated afterwards. About 55% of house owners who have emptied their pits indicated encountering difficulties ranging from the lack of access for emptying trucks; lack of space to dig disposal pit; high emptying cost; strong smell; ill equipped emptying service providers; unavailability of a latrine during the emptying period; semi-solid sludge mixed with solid waste; and the difficulty in finding emptying service providers. Due to the nature of the emptying job to which a social stigma is attached, it is becoming increasingly difficult to find peoples who are willing to provide this service, hence the high cost. Identifying latrine technologies that are easier to empty and providing infrastructure for sludge disposal are major factors in scaling up access to hygienic sanitation in low-income urban settlements.

4.10 Summary

The purpose of this chapter is to present data collected during the study alongside key research questions outlined in chapter 3. The chapter is divided into two parts, qualitative and quantitative, in order to provide better clarity and sequence to the data analysis. It also provides the opportunity to show how various methods were used to collect data for the research. This section summarises the general and specific findings from the study

The general findings from the research are as follows:

- Household sanitation in low-income urban settlements is mainly provided by small independent masons referred to in this thesis as Small Independent Providers of Sanitation (SIPS). Analysis of qualitative data highlights the limited knowledge of affordable hygienic latrines by SIPS. The case studies provide field insight into the efforts and difficulties encountered in trying to increase access to hygienic latrines in low-income settlements.
- Findings from the study indicate that SIPS have undergone limited or no training on hygienic lower cost household latrines hence their inability to provide such facilities in low-income settlements. The poor infrastructure for sanitation

in low-income settlements makes it even more difficult to empty and sustain existing latrines.

- Qualitative and quantitative analysis reflect house owners' frustration on the quality of the latrines in use. The knowledge of sanitation options is also limited to the options known to SIPS. Some of the factors that contribute to poor access to hygienic latrines in low-income settlements include limited knowledge of affordable options, high cost of known 'good' latrines, space, environmental conditions, difficulty of emptying full pits, complexity of acquiring latrines from SIPS, poor infrastructure to support sanitation and low levels of income.

The specific findings from the study have been summarised in two parts as follows:

SIPS capacity to deliver improved sanitation services:

1. Knowledge and awareness of latrine technologies:

- Knowledge and awareness of latrine technologies/options varied amongst different SIPS groups but in general can be divided into three main technology types; *dry, wet and ecological latrines*. Dry latrines include traditional pit, basket, tyre and brick-lined pits, and sanplat. SIPS that have attended trainings organised by NGOs knew more latrine technologies than those that have not been trained.
- The indicators for a good latrine include durability, safety, shape of pit (round), lining material, easy access for emptying and affordable cost of installation, operation and maintenance. The 'brick' latrine is perceived to meet most of these criteria. Although pour-flush and WC are perceived to be the best and the most hygienic options, the cost of installation and maintenance makes them unsuitable for low-income earners. The 'brick latrine' is the most widely built and used technology in the low-income settlements.

2. Skills and experiences of SIPS:

- In general, construction skills amongst trained and untrained SIPS are similar. The results identified four categories of latrines that are being built by SIPS in low-income urban settlements as: group level 1 (traditional pit, basket, tyre and drum latrines); group level 2 ('brick' and sanplat latrines); group level 3 (ecosan and pour-flush latrines); and group level 4 (water closet – WC toilets). Both trained and untrained SIPS are familiar with and experienced in building most of the latrine in groups level 1 and 2. The findings indicate that only trained SIPS had the skills and experiences for level 3 latrines while level 4 are only built in middle and high income areas by SIPS that have attended technical colleges.
- Both trained and untrained SIPS are capable of building superstructure. Whilst some SIPS have the necessary carpentry skills others engage a carpenter to complete the roofing if the client demands for a roof. The materials and size of a superstructure is dependent on what the house owner can afford but can vary from plastic sheets, thatch, mud, corrugated iron sheets, wood, or cement blocks.
- Pit emptying services are usually provided by a small group of SIPS known locally as 'frog men' using manual methods. Some of the SIPS that build latrines also provide emptying services but do not like to be singled due to the social stigma associated with this type of work.
- Findings indicate that the majority of the SIPS to provide services in low-income urban settlements did not attend formal technical training. The majority learnt on the job while working with relatives, friends and acquaintances. Masons that have attended technical colleges rarely provide services to low-income unplanned settlements but are perceived to work only in middle and high income settlements. Three categories of small independent sanitation providers were identified from the study. They are, *untrained sanitation providers*; (never attended any form of organised training); *trained sanitation providers*: (attended training sessions on lower-cost latrine technologies organised by NGOs); *Pit emptying service providers*: (manual labourers with no form of training).

3. Process of delivering household sanitation:

- The process of delivering household sanitation can be complex and sometimes difficult for both the SIPS and the house owners. The lack of access to reliable information on latrine technologies and skilled latrine builders is a problem. SIPS are often mistrusted by house owners, as they do not have means of certifying that they have the necessary skills.
- The process for the delivery of household sanitation by SIPS can be divided into 4 key steps:
 - The 1st step is to find new clients. SIPS are often recommended to potential clients by the previous ones.
 - Step 2 involves a site visit, discussion about latrine type and negotiation of labour costs with the house owner. Contracts are agreed orally as soon as negotiations are completed, without a third party. The cost of digging an average pit of 12ft ranges from TZS30, 000 – 60,000 depending on the soil condition. Lining and platform construction cost between TZS40,000 – 100,000 depending on the depth. All construction materials are provided by the house owner and are therefore not included in the costing by SIPS. Payment systems are also negotiated and agreements reached on how payment of the total costs will be spread. A common approach seems to be to divide the payment into 3 parts, 25% at the beginning, another 25% half way and the remaining 50% on completion of the latrine.
 - The 3rd step is the actual construction of latrines. The SIPS contracted to build a latrine often gets a labourer to dig the pit while he prepares for the lining. In some places, they encounter technical difficulties such as unstable and poor soil conditions causing pits to collapse at the expense of the SIPS, and sometimes fatal.
 - The 4th and most problematic step in the sanitation delivery process is emptying. A key aspect of ensuring sustainability of hygienic latrines is to ensure a reliable and efficient emptying system. Unfortunately, this is often not the case in low-income urban settlements. Only levels 2 and 3 latrines

can be emptied and are done manually by men known locally as 'frog men' with no protective gear or equipment.

- o Emptying of full latrines is a difficult and hazardous task hence the high cost. The cost ranges from TZS30, 000 to 100, 000 depending on the depth of the latrine and the distance to the disposal site. Contents of full pits are disposed in a freshly dug pit close to the existing latrine. The rising population density in low-income urban settlements has resulted in the construction of more houses in areas where space is already a problem. This is having a negative impact on access to hygienic latrines, as emptying full latrines is becoming more difficult due to the lack of space to dig pits for sludge disposal.

House owners' knowledge and experiences of acquiring sanitation services

Qualitative and quantitative analyses of data related to house owners were conducted. Of the 427 house owners that participated in a survey, 78% were men while the remaining 22% were female. Gender was considered an important consideration in order to assess differences in access to hygienic latrines in houses according to the sex of the owners.

1. House owners' knowledge and preferences for latrine

- Knowledge and awareness of latrine technologies/options amongst house owners are limited to the same options known to SIPS. There are no significant differences between landlords and ladies. The most widely known latrine option is the 'brick latrine and the least known is ecosan and basket latrines. The majority of house owners own use a 'brick' latrine. Those who cannot afford a brick latrine build a drum latrine as a temporary measure. A sanitation ladder that reflects the perception of house owners places tyre latrine at the bottom of the ladder and WC at the top (see figure 6).
- According to the data, the key attributes that house owners desire in a latrine include stability and durability, easy access for emptying, limited or non-use of water for flushing, no smell, ceramic squat pan and vent pipe. Although many houses use their latrines as bathrooms, house owners' preference will be to

have them separate but due to the lack of space, latrines generally combine as latrines.

- House owners' motivations for installing latrines include financial benefits with the potential to attract better rents, avoiding the inconvenience of using neighbours' latrines and status particularly for those in authority. Findings indicate that majority of the house owners would like to have a hygienic latrine in their houses but are unable to. Some of the barriers to installing improved latrines include: lack of places to obtain reliable information on improved low-cost latrine options and skilled SIPS; pit emptying difficulties; irregular access to water supply; and limited space.

2. House owners' experiences of acquiring sanitation services

- The process of acquiring latrine begins with identifying SIPS. As there are no reliable places for identifying skilled SIPS, the data indicates that house owners rely on recommendations from friends, relatives and acquaintances. This agrees with the findings from the focus group discussions with SIPS.
- Costs of labour and payment system are agreed orally with the SIPS, and all construction materials are provided by the house owner. A 'brick' latrine usually costs between TZS250,000 – 350,000. Payments are made in instalments, as it allows house owners to control the latrine building process and ensure that it is completed. Payments for emptying are also done in two instalments, once at the beginning and the remainder on completion.
- A key aspect of sustaining access to hygienic latrines in low-income urban communities is a reliable and efficient emptying and disposal system. This important aspect is lacking in most of the study areas, as house owners encounter difficulties with emptying full latrines. There is no infrastructural support to facilitate hygienic emptying and disposal of sludge.
- Considering all the potential barriers to scaling up access to hygienic latrines in low-income urban settlements, house owners indicated that assistance is required from external agencies and the government if access is to be scaled up. This includes:

- provision of information of more lower cost latrines information through latrine information centres and showrooms containing drawings, information and costs of various options, and also certified lists of SIPS with the necessary skills;
- training of SIPS on the construction of hygienic low-cost latrine options;
- provision of infrastructure to support pit emptying and sludge disposal such as the communal cesspits or secondary storage tanks in the low-income settlements;
- facilitating the availability of low-interest loans and other micro- credit facilities; and establishment or enforcement of the sanitation laws and penalties for offenders and finally.

The qualitative and quantitative data identified gaps in the SIPS capacity to upscale and accelerate the delivery of improved sanitation in low-income urban settlement. The gaps directly related to the SIPS include the lack of knowledge and skills in the construction of various latrine technologies, which could be improved through training. However, training alone is not enough to build the capacity of SIPS to upscale the delivery of improved sanitation. Other gaps that need to be filled include: developing more appropriate latrine options for low-income settlements; assisting SIPS with generating demand; and creating the enabling environment to maximise the effectiveness of SIPS.

The findings of the research and the implications are discussed in detail in the next chapter.

Chapter 5: Discussion and implication of findings

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Chapter 5: Discussion and implication of findings

5.1 Chapter outline

This chapter takes data analysis into consideration within the wider framework for the research. The key research questions and the study hypothesis are revisited in section 5.2, where research findings were applied to the primary and secondary research questions and also to the hypothesis testing. The discussion of research findings is presented in 5.3, which is divided into six sub sections. Section 5.3.1 describes the typologies of SIPS, and the factors that affect their capacity to upscale the provision of improved sanitation is outlined and discussed in section 5.3.2. The findings in relation to sanitation delivery skills of SIPS, latrine technologies, demand generation and the enabling environment for SIPS are discussed in sections 5.3.3 to 5.3.6. The implications of findings and areas of support for SIPS are outlined in section in section 5.4.

5.2 Response to research questions and hypothesis testing

This section presents the responses to the research questions that were identified in chapter 3 (3.5) and re-examines the hypothesis in relation to the analysis of data.

Primary research question

Do small independent providers have the capacity to upscale and accelerate the delivery of improved sanitation at a scale necessary to close the gap in access?

The data from the research indicate that the ability of SIPS to deliver improved household sanitation at a scale can be disaggregated into three major aspects;

- i. The actual capacity of SIPS, measured in terms of their knowledge of low-cost latrine options, skills and experiences of installing and emptying latrines, and relationship with household (customer services). These are related to 'supply' issues.

- ii. House owners' preferences for latrines and experiences of acquiring sanitation services from SIPS, (access to information on latrine options, ease of locating skilled SIPS, and relationship during installation and emptying). These are related to 'demand and uptake' issues.
- iii. The enabling environment to support effective and sustainable delivery of improved sanitation. Enabling environment as defined earlier in chapter 2, section 2.10 refers to all the necessary support (with the government as key player) required to sustain the delivery of sanitation services in low-income urban communities by SIPS. These consist mainly of pit emptying and sludge disposal support; and development and enforcement of appropriate policy and regulatory framework (including certification of skilled SIPS and enforcement of sanitation bye-laws). Although the development of appropriate sanitation technologies and generating demand for improved sanitation are important for upscaling the delivery of improved sanitation, and SIPS also need to be supported in these areas, they have been addressed separately.

The limited knowledge of low-cost latrine options, the complex relationship with house owners and the lack of appropriate enabling environment significantly affect the ability of SIPS to deliver improved household sanitation at scale in low-income urban communities. These issues are further discussed in detail in the examination of the secondary research questions.

Key research question 1

- i. *What level of knowledge do small independent sanitation providers possess?*

Objective: To assess small independent providers' knowledge of latrine options, emptying and disposal services.

The analysis of data in chapter 4, section 4.2 indicates the following major points:

- i. Knowledge of low-cost improved latrine technologies amongst untrained SIPS is limited to a few options (pit latrine lined with cement blocks) with potentially high cost of installation and emptying. The trained SIPS on the

other hand have been introduced to various latrine options and are aware of lower cost options than their untrained counterparts.

- ii. Both trained and untrained SIPS are in theory aware of the manual and mechanical methods of pit emptying but in practice only use manual methods. Their knowledge of disposal of pit contents is limited to burial in freshly dug pits next to the existing latrine. Only those SIPS residing close to the government waste stabilisation ponds are aware of the facility and its functions.

The implications of these findings are shown in many ways as follows:

- Limited knowledge of affordable improved latrine options amongst SIPS impacts on their capacity to respond to household preferences and can potentially have a negative impact on their ability to upscale access to improved sanitation in low-income urban settlements.
- The lack of knowledge and equipment to facilitate mechanical emptying of pits coupled with the lack of infrastructure to support disposal will continue to have a negative impact on access to improved hygienic sanitation in low-income urban settlements.
- SIPS, particularly those that have been exposed to various latrine options during training, are unlikely to promote these technologies widely because they have not been tried and tested over time, and SIPS do not possess the skills to market their products and services. As a result, house owners will continue to demand and pay for expensive inappropriate latrines.

Key research question 2

What skills do SIPS possess and what are their experiences of delivering sanitation services to households? Objective: To examine the skills and experiences of small independent providers in relation to installing and emptying various latrine technologies.

The data analysis in chapter 4, section 4.3 indicates the following key points:

- i. Six categories of small independent providers of sanitation services in low-income urban communities were identified. They include *latrine construction SIPS; latrine emptiers; sludge removers; latrine/bath facilities managers; sludge treatment and untrained disposal; and suppliers*. The detailed description and characteristics of respective categories are outlined in section 5.3.1. A common feature amongst the majority of the SIPS is that they acquired their skills outside of formal school but learnt on the job as apprentices. However, there were a group of latrine builders that have attended training on low-cost latrine construction organised by NGOS. Masons trained in technical colleges rarely provide services to low-income settlements but are perceived to work only in middle- and high-income areas.
- ii. In general, construction skills amongst trained and untrained SIPS are dissimilar, particularly in relation to pit size. Prior to attending training, all SIPS believed that digging large pits (3m x 3.5m) is the best method of assuring that latrines last longer. This can be a major barrier to scaling up access to improved latrines, as space is very limited in low-income urban settlements. However, in areas with trained SIPS, freshly dug pits were noticeably smaller (1m x 3m) and in some cases there are two alternating pits. This not only saves space but also reduces the quantity of materials required for lining thereby saving cost.
- iii. The types of latrines built by SIPS can be grouped into four categories.
 - Category 1 consists of the lowest cost options, which include traditional pit, basket, 'tyre', and drum pit latrines. The majority of the SIPS have the skills to build these latrine options.

- Category 2 consists of 'brick' and sanplat latrines. Both trained and untrained SIPS have the skills for building brick latrines but only a few SIPS that have been trained and given the sanplat mould can install these latrines. Some trained SIPS have acquired the skills to make and use interlocking trapezoidal blocks to line round pits. Although this saves money from not using cement mortar, most SIPS are sceptical about this method of lining. Blocks held together with cement mortar are still the most widely used method of lining. This the SIPS attributed to the wide availability of cement blocks that do not require special training or moulds.
- Category 3 consists of the ecosan and pour-flush latrines. The ecosan technology was relatively new and only a few trained SIPS had the skills for building ecosan. Both trained and untrained SIPS are familiar with and are experienced in building latrines similar to the pour-flush technology. However, the untrained SIPS do not seem to understand the concept of the water seal in a pour-flush latrine, thus the latrines are installed without u(s)-bends that provide the water seal.
- Category 4 is the water Closet (WC) latrine option. SIPS in low-income urban settlements do not often get the opportunity to build WC toilets, as they are left for those who have been to technical colleges. The high cost of installation and maintenance makes WCs unaffordable for residents of low-income areas.

- iv. Full latrines are emptied manually by a specialised group of labourers known locally as 'frog men', though some SIPS that build latrines also provide this service. In addition to using manual methods, these groups of SIPS have developed a local solution of kerosene and salt to reduce the smell and to solidify the sludge to make it easier to remove with spade and buckets. Contents of pits are disposed of in freshly dug pits where space permits or thrown in the gullies.

The implications of these findings are:

- Considering that there are not many SIPS with the necessary skills for lower cost improved latrines other than the brick latrine, a large number of house owners will continue to acquire the services of untrained SIPS to install high cost latrines or cheaper unhygienic options that are often poorly constructed.
- There is a need to develop or identify other lower-cost latrine options for low-income urban settlements that satisfy user requirements, particularly durability, use less water and are easier to empty.
- Although only a few SIPS have attended training on the construction of appropriate low-cost latrines, the majority of the untrained ones are innovative and quick to copy from the trained ones. This is evident from the data analysis in chapter 4 (4.3) where SIPS that have not attended any training are copying others in the construction of the ecosan latrine. This indicates that investing resources in training more SIPS could potentially have wider impact, as many more SIPS will benefit indirectly.
- Emptying full pits is a key aspect of ensuring sustainable hygienic latrines. The problems with manual emptying and disposal outlined in section 4.3.5 of the data analysis indicate that further work is still required to identify more hygienic and appropriate methods. However, hygienic pit emptying and disposal cannot be achieved without infrastructural support (an aspect of the enabling environment defined earlier in section 5.3), which goes beyond the capacity of the SIPS. Hence the need to establish a favourable enabling environment to support the services of SIPS in low-income urban communities.

Key research question 3

How do small independent providers of sanitation deliver sanitation services to households? Objective: To gain in-depth understanding of the process for delivering latrines and providing emptying services to households.

The analysis of data in section 4.4 indicates the following key points:

- i. SIPS are informal in their operation as indicated in the review of literature in section 2.8; they have no specific locations or systems for segregating skilled from bogus ones. SIPS rely on recommendations from previous clients to get new clients, or a potential client may encounter them working on a new latrine. Their informal nature also means that house owners often do not trust SIPS to deliver the desired and agreed latrine option.
- ii. The lack of centres for information on latrine technologies and skilled SIPS has made it difficult to have a standardised or uniform approach for costing for labour for installing new latrines or emptying full pits. The final cost depends on the negotiation skills of the SIP and his perception of the financial capacity of the client.
- iii. The majority of SIPS only charge for labour, as the construction materials are provided by house owners. Labour charges are divided into four stages; (1 - pit digging; 2 – pit lining and platform; 3 - superstructure; 4 - roofing). Generally, there are no written contracts between SIPS and house owners and agreements are made orally as indicated in the data analysis in section 4.4.2. This often results in problems during payment, as there is nothing to fall back on as evidence of the agreement.
- iv. The informal nature of low-income settlements often means that only SIPS are willing and are accustomed to delivering sanitation services in these areas with its technical and socio-economic difficulties. Masons that are formally trained often prefer to install straightforward WC latrines in planned settlements. Technical difficulties include unstable soil, high water table, limited space, (building on old latrines and burial sites), and lack of disposal sites for pit emptying. Socio-economic difficulties include problems with house owners not paying the agreed amount at the agreed time, competing priorities (abandoning lower paying jobs for higher paying ones), and inadequate construction materials also affect effective delivery of sanitation services by SIPS.

The implications of these findings are:

- Findings from the adapt analysis in section 4.4.3.2 – SIPS' indicate that the lack of an effective policy and regulatory system for SIPS, and the lack of latrine information centres with the list of skilled SIPS will mean that the few trained SIPS are not able to deliver services wider than their areas of operation where they are known. Bogus SIPS will also continue to operate leading to the delivery of poor sanitation services to house owners.
- The lack of a standardised system of costing latrines as shown in section 4.4.2 has a negative impact on access to improved latrines. Extracts of the focus group discussion in appendix 5.8 (box 20) indicate that SIPS can undercut fellow builders to take a job that has already been negotiated. On the other hand, a house owner may go for cheaper labour cost and end up with a poor quality latrine as a result.
- Some of the technical difficulties encountered by SIPS are beyond their control and can potentially limit their ability to deliver and sustain hygienic on-plot sanitation in low-income urban settlements. In many cases, SIPS have been buried while excavating, lining or emptying pits - as indicated in section 4.4.3 and supported by extracts from focus group discussions in appendix 5.9. There is need for planners and programmers to consider options other than on-plot sanitation technologies particularly for low-income urban settlements. The factors that affect SIPS capacity to scale up the delivery of improved sanitation are discussed in detail later on in section 5.3.2.

Key research question 4

What is the nature of house owners' knowledge and preferences for sanitation?

Objective: To assess household knowledge and preference for latrine options and emptying services.

The analysis of data in section 4.4 indicates the following points:

- i. Knowledge and awareness of latrine technologies/options amongst house owners are limited to the same options known to SIPS, with brick latrine being the most widely known and used option, and the ecosan latrines the least known and used. This is mainly because the majority of house owners

obtain information about latrine technologies from their relatives, neighbours and acquaintances (table 18 in chapter 4) that also got their information from SIPS.

- ii. The key attributes that house owners want in a latrine in no particular order are; stability, durability, easy access for emptying, aesthetics (installation of ceramic squat pan and vent pipe), limited or non-use of water for flushing, no smell, a latrine separate from the bathroom and above all affordability (see section 4.2.4). Although privacy is an issue, people do not seem to mind having an incomplete superstructure as long as the latrine has most of the attributes listed above. This is evident from the data analysis in chapter 4 (section 4.3.3).
- iii. Brick and drum latrines are the most common options in low-income urban settlements of Dar es Salaam. However, users expressed dissatisfaction with the performance of drum latrines due to the smell, flies and emptying difficulties.
- iv. Although many houses use their latrines as bathrooms, house owners' preference will be to have them separate but due to the lack of space, latrines generally combine as bathrooms.

The implications of these findings are:

- House owners are unlikely to demand for latrine options that are uncommon and have not been tried and tested over time. The limited knowledge of appropriate latrine options amongst most of the SIPS also means that the choices available to house owners are limited. The current situation resembles a case of the 'blind leading the blind'. The introduction of a new latrine technology by SIPS may not necessarily lead to increased demand and uptake except when they are promoted and marketed with external support from NGOs and government agencies. An example is the ecosan latrine that was introduced and promoted by NGOs and they were found only in the settlements where those NGOs were working. Although some SIPS that are based in other locations have learnt to build ecosan latrines, as mentioned earlier, ecosan latrines did not exist in these locations. NGOs

often have the resources to support the construction of sample latrines, which gives house owners the opportunity to see, and where possible trial, the latrine where as SIPS do not have such resources.

- Sanitation promotion supported by government and other stakeholders such as NGOs should be targeted at house owners or their appointed decision makers. Because they have decision-making powers, they are in a position to demand for a particular latrine option. SIPS may otherwise be afraid to promote new technologies to avoid any blame for poor performance of the facility.
- Planners including municipal governments and NGOs need to take user preferences into consideration and ensure that they offer a variety of options to increase demand and uptake across various categories of users.

Key research question 5

What are house owners' experiences of acquiring sanitation services from small independent providers? Objective: To examine household experience of latrine use and maintenance and the services of small independent providers.

The analysis of data in chapter 4 (section 4.6 and 4.9) indicates the following points:

- i. As SIPS do not have designated centres, house owners depend on recommendations by neighbours, friends and relatives to identify SIPS to provide their sanitation needs. There are issues on how to identify a 'real' latrine builder or emptying service provider, as there are so many bogus ones and it is difficult to certify which SIP has the necessary skills for various latrines. This is consistent with the earlier key points in the response to key research question 3 (numbers i and ii).
- ii. House owners have limited trust in SIPS because they can be difficult to track down if there are issues during latrine installation such as missing construction materials and not turning up after receiving payment. All construction materials are usually provided by house owners.

- iii. Agreement on labour cost is based on the depth of the pit, which house owners find difficult to verify especially in areas with high water table. Many found that SIPS do not always dig to the agreed depth in order to make more profit. This is evident from the quotes in box 29 (*P 3: landladies vingunguti.txt - 3:7 (75:77) (Super) Codes: [Experience with SIPS] in appendix 5.11*). In addition, there is no guarantee from SIPS as even if the latrine breaks down 2 weeks after installation, the responsibility lies with the house owner.
- iv. The cost of installing a brick latrine has been on the rise, from Tzsh125,000 – 150,000)¹ in the 1990s and more than Tzsh400,000 in 2005. These costs include Tzsh40,000 – 60,000 for pit excavation; about Tzsh90,000 for blocks, and Tzsh175,000 – 250,000 for pit lining, platform and half superstructure without roofing.
- v. Labour costs are paid in instalments by house owners (3 – 5 times). This payment system gives the house owners time to gather enough money and also serves as a check to ensure that SIPS deliver on the agreement.
- vi. Emptying a full latrine is carried out manually by a special group of SIPS and requires the owner to have space for digging a new pit to dispose of the sludge. In some cases where space is lacking, pits are dug in bedrooms and covered afterwards. If a house owner does not have any space at all, he may not be able to empty his latrine or may be asked to pay much higher for the sludge to be disposed of, often in the gullies.
- vii. Emptying cost can be quite high (up to 60% of the cost of a new latrine) and includes the cost of digging a new pit and renovating the platform broken to gain access to the full pit (see chapter 4; 4.3.2 and 4.6.5). House owners find it even more difficult to verify whether SIPS have emptied the entire contents of the pit.

¹ Tzsh1,000 was equivalent to USD1

The implications of these findings are:

- There is evidence to show that house owners can and will pay for a latrine that satisfies their need as long they know that the SIPS are reliable and have the necessary skills.
- The general belief amongst house owners that SIPS are people not to be trusted often results in conflicts during latrine installation and could have a negative impact on reliable and trained SIPS. This mainly stems from the problems encountered in relation to construction (chapter 4, section 4.4.3.2); and paying SIPS for their labour (see quotes in appendix 5.11, box 30 and 31).
- Due to the high cost of installing a brick latrine, most house owners build their latrines in stages leaving out the completion of the superstructure. Hence the large number of incomplete latrine structures referred to by residents as 'passport latrines', because users can be seen from shoulder upwards when they stand inside. This indicates that house owners and other latrine users are willing to forfeit some level of privacy as long as other attributes are satisfied.
- The lack of disposal sites close to low-income urban settlements makes emptying more complex and costly. As a result, house owners that do not have space for new pits are more likely to dispose of the sludge in an unhygienic manner to save cost. Those who cannot afford either often revert back to defecating in the open or using their neighbours' latrines.
- Increasing access to hygienic latrines in low-income urban communities not only requires providing a choice of affordable latrine options, but also developing a system for house owners to be able to access information on various latrine options, cost estimates, emptying services, and skilled and reliable SIPS.

Hypothesis testing

The hypothesis that guided the study is '*Small-independent providers have the capacity to deliver improved sanitation and are significant actors in scaling up and accelerating access in low-income urban settlements*'.

Using the hypothesis as a guide, the study investigated current thinking amongst sector practitioners, that small independent providers of sanitation are the major actors in scaling up access to hygienic latrines in low-income urban settlements. This is based on the evidence that these informal sector groups have provided more latrines (fully paid for by house owners) than government and donor agencies combined (Cairncross 1999). This led the research to consider two units of analysis – small independent providers of household sanitation and owners of houses (or their appointed decision makers). Reviewing the data gathered and analysed for the thesis in the three municipalities of Dar es Salaam shows that SIPS are definitely key actors in providing access to latrines but do not necessarily have all the capacity required to achieve coverage of improved sanitation at scale. This signifies that the second part of the hypothesis is proven while the first part is disproved.

Analysis of data from 427 questionnaire surveys and focus group discussions with 110 house owners showed they all paid SIPS to install their, maintain or empty their latrines. However, the findings also indicate that there are issues regarding the quality of latrines built and difficulties with emptying and disposal of full pits. The increasing population and high density in low-income the low-income urban settlements where the research was conducted is making it physical more difficult for SIPS to deliver improved sanitation. The discussion of findings in section 5.3 further supports the above statement. It defined the typology of SIPS and their characteristics and identified those deliver sanitation services in low-income settlements. Some of the identified factors that impact on their ability of SIPS to upscale the delivery of improved sanitation are related to their skills, available latrine technologies, sanitation demand and the enabling environment discussed in section 5.3.2.

5.3 Discussion of findings

The gap in information on the typology of SIPS was highlighted in the literature review. The available information on the classification of small-scale water supply providers formed the guide for developing a typology for SIPS based on the type of service that they provide. However, analysis of findings from the research yielded further details and has been used to expand the typology of SIPS developed from the literature review. This section outlines the typology of SIPS and further discusses the factors that limit the ability of SIPS to scale up the delivery of improved sanitation.

5.3.1 Typology of small independent providers of sanitation

Based on the analysis of findings and the review of literatures, SIPS can be put into six categories which fall under three broad clusters as outlined in Table 30.

- *Informal domestic providers:* This cluster is made up of two broad categories, *latrine construction and latrine emptying SIPS*. The first category includes pit diggers, untrained and informally trained latrine builders (masons) while the second category consists of manual labourers that provide cleaning and emptying services. The informal domestic providers that operate in low-income urban settlements are the main focus of this thesis.
- *Formal domestic providers:* These include sludge removal SIPS that operate suction trucks for cleaning septic tanks. They mainly provide services to middle- and high-income areas but sometimes also provide services to the low-income areas. They are considered formal because they have to register with the authorities as a requirement before they can be allowed to dump sludge at the treatment plants.
- *Formal and informal public services providers:* These are operators of public latrines and shower rooms that make profit out of their services. They often operate in big cities and in public places. Other groups in this cluster include

private sludge treatment and disposal plants and suppliers of latrine building materials.

Table 30: Typology of small independent providers of sanitation

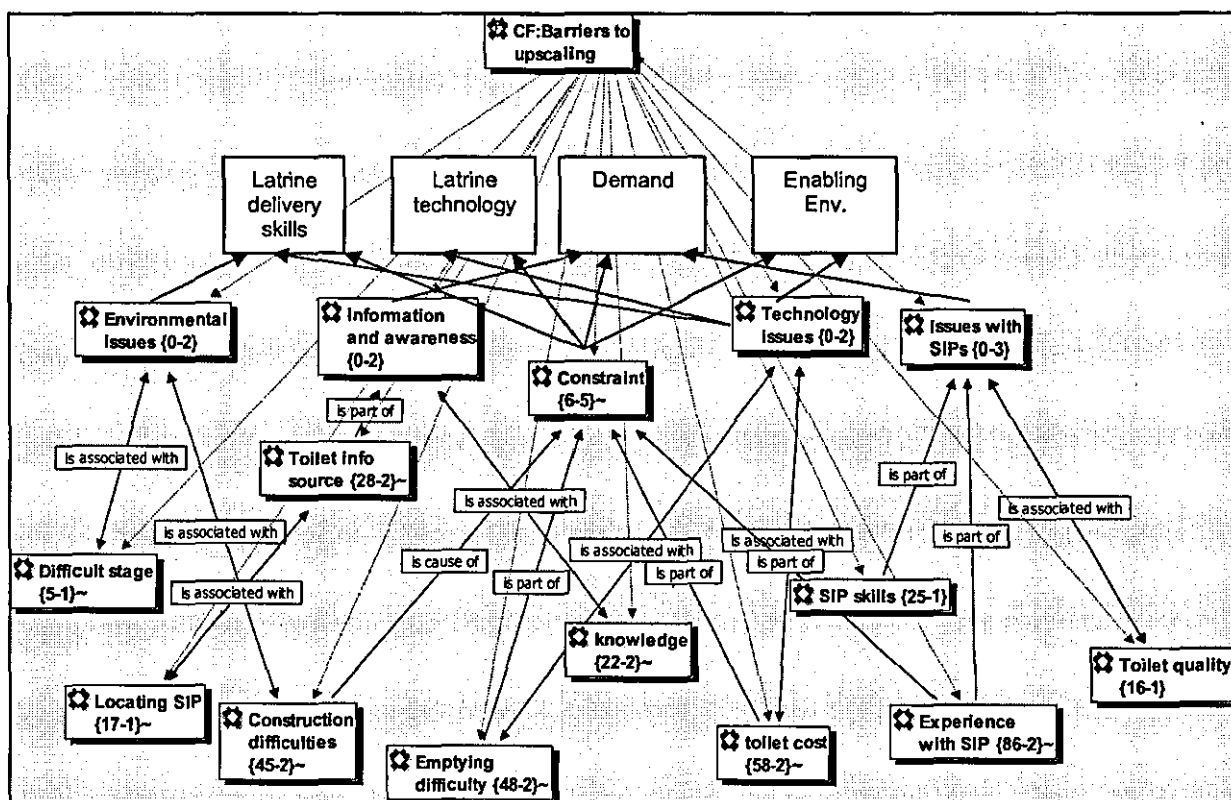
Cluster	Category	Group	Characteristics
A. Informal domestic providers	1. Latrine construction SIPS	1.1 Latrine pit diggers	<ul style="list-style-type: none"> • Unskilled manual labourers • Works jointly with latrine builders
		1.2 Untrained masons	<ul style="list-style-type: none"> • No special training on low-cost latrines • Installs mainly individual household pit latrines
		1.3 Informally trained masons	<ul style="list-style-type: none"> • General mason with no formal training • Attended training courses on low-cost latrines organised by NGOs • Installs various options of individual household latrines
		1.4 Formally trained masons	<ul style="list-style-type: none"> • Installs toilets (WC) mainly in middle and higher income areas • Contracted by organisations or government to install individual and/or public latrines
	2. Latrine emptying SIPS	2.1 Manual cleaning services providers	<ul style="list-style-type: none"> • Cleans and removes from bucket latrines (almost phased out)
		2.2 Manual pit emptiers	<ul style="list-style-type: none"> • Unskilled manual labourers. • Empties pit latrines manually
		2.3 Mechanised manual pit emptiers	<ul style="list-style-type: none"> • Uses mini suction trucks (e.g. vacu-tug) to empty full pit latrines
B. Formal domestic / institutional providers	3. Sludge removal SIPS	3.1 Septic tank suction truck operators	<ul style="list-style-type: none"> • Empties septic tanks mainly for WC toilets • Operates in middle and high-income settlements
C. Formal / Informal public services providers	4. Latrine management SIPS	4.1 Owner / operator / franchisers of public latrines & bathing facilities	<ul style="list-style-type: none"> • Charges a fee to manage public facilities
	5. Sludge treatment and disposal	5.1 Private sludge treatment plants	<ul style="list-style-type: none"> • Similar to government sludge treatment plants but much smaller
	6. Suppliers	6.1 Direct and wholesale retailers	<ul style="list-style-type: none"> • Private sanimart operators • Vendors of latrine construction materials and components

The typology of SIPS described in the table above clearly identifies the group that provide sanitation services to low-income urban settlements and their characteristics. This helps the literature gap on these SIPS are and how to identify them. The findings show that SIPS that deliver sanitation services to low-income urban settlements belong to the 'informal domestic providers' cluster and are made up of groups 1.1 to 1.3 under the latrine constructions category. An interesting finding is that SIPS that attended formal training mainly deliver sanitation services to planned middle and high income settlements. This gives an insight into the technical capacity of the SIPS that deliver sanitation to the low-income settlement and further supports the disproving of the second part of the hypothesis. In relation to the category of latrine emptying SIPS, only groups 2.2 and to a lesser extent 2.3 were found to operate in these areas. This finding further highlights difficulties with sustaining the existing latrines and questions the suitability of on-plot sanitation for low-income urban settlements. It also questions the capacity of SIPS to upscale the delivery of improved sanitation if manual emptying with accompanying difficulties continues to be widely used method, again disproving the second part of the hypothesis. The next section discusses some of the factors that impact on the capacity of SIPS that operate in low-income urban settlements to upscale the delivery of improved sanitation.

5.3.2 Factors that affect SIPS capacity to upscale the provision of improved sanitation

The review of literature and the analysis of data facilitated the classification of SIPS. The findings strongly suggest that SIPS capacity to deliver improved sanitation at scale in low-income urban communities is restricted not only by their knowledge and skills of appropriate latrine technologies, and user demand, but more importantly by the enabling environment (as defined earlier in 5.2, number iii of the primary research questions) . This finding is supported by the network view (figure 9) generated from the analysis of the qualitative data using ATLAS-Ti software.

Figure 9. Barriers to scaling up delivery of improved sanitation by SIPS



The network view highlights four key issues, as summarised in (table 32) and are grouped into upper and lower level categories, which are interconnected. The nature of the relationship between the various categories is defined in three ways; 'is associated with', 'is cause of', and 'is part of', and summarised below. The upper level categories are environmental issues; technology issues; issues with SIPS skills; and information and awareness all related to the findings from the data analysis in chapter 4.

- *Environmental issues* consist of 2 super codes and 'is associated' with *difficult stage* (with 5 quotes), and *construction difficulties* (with 45 quotes).
- *Technology issues* consist of 2 super codes and 'is associated' with *emptying difficulties* (with 48 quotes), and *toilet cost* (with 58 quotes).
- *Issues with SIPS* consists of 3 super codes and 'is associated' with *toilet quality* (with 16 quotes); 'is part of' *experiences with SIPS* (with 86 quotes) and *SIPS skills* (with 25 quotes).

- *Information and awareness* consists of 2 super codes and 'is part of' *toilet info source* (with 28 quotes), 'is associated with' *locating SIPS* (with 17 quotes) and *knowledge* (with 22 quotes).

The network view shows how the linkages between the various constraints to upscaling the delivery of improved sanitation in low-income urban settlements by SIPS. The summary of the constraints in table 31 and the follow-up discussion of findings in sections 5.3.3 to 5.3.6 demonstrate the linkages and further reinforce the assumption that the four issues cannot be addressed in isolation if SIPS are to develop the capacity to upscale the delivery of improved sanitation.

- Environmental issues*: linked with SIPS skills, (A) in Table 31 and include construction difficulties encountered whilst digging and lining pits in unstable soil conditions. These issues are mainly as a result of the conditions of low-income settlements, which are often located in 'no man's land' that are prone to flooding, marshy or degraded land. The literature in chapter 2 highlighted the challenge faced by utilities and sector specialists in identifying appropriate sanitation technologies for these settlements. The analysis of data on problems encountered by SIPS (section 4.4.3) and some the constraints to installing latrines mentioned by house owners (section 4.5.5) highlight the impact of the environmental issues on acquiring sanitation in low-income urban settlements.
- Technology issues*: linked with knowledge of latrine technologies and enabling environment, (B and D) in Table 31 and include the limited knowledge of latrine options, high cost of installing known 'good' latrines, and the difficulties with emptying full latrines. The findings from the research indicate that the existing latrine technologies in low-income urban settlements are no longer suitable for the conditions and the looming population explosion. This is also similar to the issues highlighted in the literature review where some authors have suggested alternative technologies such as simplified sewerage.

Table 31: Enhancing SIPS capacity to upscale provision of improved sanitation

Key factors for success	Attributes
A. Sanitation delivery skills	<ul style="list-style-type: none"> • SIPS knowledge and skills for delivering appropriate and improved sanitation
B. Latrine technologies	<ul style="list-style-type: none"> • Suitability of the existing latrine technologies and emptying mechanisms
C. Demand generation	<ul style="list-style-type: none"> • SIPS roles and place in sanitation promotion such as sanitation marketing. • Access to information about improved sanitation and skilled SIPS
D. Enabling environment	<ul style="list-style-type: none"> • Infrastructure to support latrine emptying and sludge disposal • Appropriate public policy and regulatory framework to support SIPS

- iii. *SIPS skills and experiences*: linked with skills and enabling environment issues (A & D) in Table 31 and play a major role in the type and quality of latrines and emptying services that they can provide to house owners. The key barriers pointed out by SIPS and house owners include construction and emptying difficulties, latrine costing and quality. The findings from the study support the indications that SIPS existing knowledge and skills are not necessarily enough to enable them to upscale improved sanitation services. The nature of sanitation provision also means that SIPS would require government to create an enabling environment to support their activities particularly in the areas of emptying and disposal of sludge. Emptying and disposal of sludge has been identified as one of the key constraints faced by SIPS in (chapter 2, section 2.9.2.2). Without the necessary infrastructure such as secondary storage tanks and access to treatment plants described in section 5.4.4, it will not be possible for SIPS to sustain the delivery of improved sanitation.
- iv. *Information and awareness*: linked with demand generation (C and D) in Table 31 and includes factors related directly to the SIPS and to the house owners. The data analysis highlighted the impact of the lack of information on various latrine options and location of skilled SIPS, which makes it difficult for house owners to acquire improved sanitation. The congestion in low-income settlements means limited open space for defecation.

Households are forced to put up some form of latrine and most times the cheapest options possible mainly due to necessity and not because it is a priority. This therefore calls for sustainable approaches for generating demand and uptake of improved sanitation. Considering the load currently carried by SIPS and their capacity, it will not be feasible to also expect them to generate the required demand on their own. This is also an area where external support is required not just for the financial requirements but also for specialist input.

- The findings from the data analysis in chapter 4 indicate that there are issues with both demand and supply of improved sanitation. The nature of low-income settlements has meant that space for open defecation is becoming even more difficult as urban population continues to grow, forcing house owners to install a latrine. However, because sanitation is often given a low priority, people are either not willing or are unable to pay for an improved latrine. Generating the demand for improved sanitation will not only help to increase the demand and uptake of improved sanitation but also motivate SIPS to deliver more effective services.
- The findings also indicate that SIPS will not be able to upscale the supply of improved sanitation in response to any potential rise in demand. This is as a result of issues within their control such as their knowledge and skills; and issues outside their control, such as availability of appropriate latrine technologies, emptying and sludge disposal, and appropriate policy and regulatory framework.

The typologies of SIPS described in table 3 were developed based on the review of literature on small-scale providers of water supply and sanitation in (chapter 2, sections 2.7 to 2.8). The network view (Figure 9) generated from the analysis of data in chapter 4 identified four major issues (Table 31) that are key to the SIPS ability to upscale the delivery of improved sanitation. These issues affect the various SIPS in different ways and as a result, the discussion of findings (sections 5.3.3 to 5.3.6) made referral to the typologies of SIPS described in Table 30 in order to identify which SIPS group are particularly

affected by the respective issues. The implications of findings in relation to the four broad constraints identified in the network view are presented in section 5.4

5.3.3 Discussion of findings in relation to sanitation delivery skills

Analysis of research findings provides some more information relating to delivery skills of SIPS, which include technical knowledge of latrine technologies, costing of latrines, construction skills, latrine delivery process and emptying mechanisms.

i. Knowledge of latrine technologies

The findings indicate that the majority of the SIPS (*typology A1 and A2*) were aware of the various options of pit latrine technology. They were also aware of the wet technologies such as the pour-flush latrines and water closet. However, it is important to note that awareness does not necessarily mean that they understand the operational mechanisms or have the skills to build these latrines. The pit latrine technology is the most widely used option in the low-income settlements, although it has limitations, which could have an impact on scaling up. The one technology that the majority of the SIPS had limited knowledge of is the ecological sanitation technology. This is being promoted as an option that will solve the emptying difficulties encountered with the pit latrine technologies (Esrey et al., 1998). However, the cost of installation, space and operational requirements makes it doubtful as the suitable technology for low-income urban settlements. The limitations of SIPS knowledge are not wholly due to their own making but is related to the technologies that are actually in existence and are being promoted by government and NGOs. The review of literature supported by the research findings suggests that SIPS are not incapable of developing latrine technologies but they copy from NGOs and public authorities and make necessary innovations. The implications of findings and guidelines for the development of appropriate technologies are discussed further in section 5.4.2.

ii. Construction skills

On-plot sanitation (particularly pit latrines – drum and brick latrines) are the main technologies that are in use in the low-income urban settlements of Dar es

Salaam and in other African cities. The majority of the SIPS (*typology A1*) have installed these latrines but do not necessarily have the right skills, as most of them learned through apprenticeship. Analysis of field data revealed that brick latrines are the most widely owned and used option. However, these latrines are often found to be in poor condition due to either poor construction, age or lack of maintenance. Construction skills amongst SIPS group A1.2 were found to be similar although informally trained masons (*group A1.3*) were found to have slightly more enhanced construction skills for low-cost latrines.

iii. Costing of latrines

Latrine costs can vary depending on the negotiation skills of the SIPS involved. Research findings show that SIPS do not have any standard approach for costing latrines. Depending on the type of latrine chosen by a house owner, SIPS make estimates of the necessary construction materials, which are then purchased by the house owner. This often creates problems as the materials are sometimes too much or too little. There are no standardised guides for costing labour and again SIPS decide on labour costs based on their perception of the client or the amount of work available in the market. Although this flexibility was identified as one of the strengths of SIPS, it is also a constraint, as it adds to the 'mystery' of acquiring sanitation which is shrouded by unnecessary secrecy. Informally trained SIPS (*group A1.3*) were found to be much better at estimating materials for house owners and maintaining some semblance of consistency in their costing of labour.

iv. Latrine delivery process and customer relations

The process of delivering sanitation services to households is rather complex, and varies depending on the SIPS and the house owner. Analysis of data from the research indicates that house owners find it difficult to locate skilled SIPS that can advise and build the latrine of their choice. This is further emphasised in the network view in figure 9 where more than 17 quotes from the analysis of data in chapter 4 (4.6.1) are related to locating SIPS. Because SIPS are informal in nature with no contacts for follow up, house owners often do not trust that they will actually deliver on the agreement. Unreliable and untrustworthy SIPS were mentioned by house owners as one the many difficulties

encountered by house owners when acquiring latrines. Figure 9 strongly supports this with 86 quotes pointing to experiences with SIPS (particularly **groups 1.1 – 1.3 and 2.2**) as a key constraint and barrier to upscaling access to improved latrines.

v. **Pit emptying**

Pit emptying difficulties were listed as a major key constraining factor to upscaling the delivery of improved sanitation by SIPS with over 48 quotes relating to emptying difficulty (fig 9). The SIPS groups (**A2.2**) that are the main emptying service providers in low-income urban settlements do not have the necessary equipment and facilities to support emptying and disposal. Hence pit emptying is carried out manually except for a few locations where an NGO is testing the use of small mechanical suction truck (SIPS group **A2.3**). Sludge from latrines is disposed of in freshly dug pits where space allows or in drains and gullies. The necessary support required for pit emptying and sludge disposal is discussed as part of the enabling environment in section 5.4.4 (i).

5.3.4 Discussion of findings in relation to latrine technologies

It was indicated earlier that SIPS (**typologies A1.1-A1.3; A2**) in table 30 have limited knowledge of appropriate latrine technologies for high density low-income urban settlements. This can strongly limit their ability to upscale and accelerate the delivery of improved latrines. The limited knowledge amongst SIPS is also mainly due to general limitation of suitable technologies for low-income areas. The problem with the existing on-plot latrines is the emptying difficulty also noted earlier. SIPS that provide the majority of the emptying services (**group A2.2**) are only aware of, and use manual emptying methods. The problem of emptying is further compounded by the lack of disposal facilities, which falls beyond the remit of SIPS.

On-plot latrine technologies are widely recognised and accepted by sector practitioners as appropriate options for low-income urban settlements. This is supported by many published and grey literature, which recommend various types of on-plot dry and wet latrines (Saywell, 2000). These options may have been suitable for low-income urban settlements in the past, but with the rising

urban population and the influx of new 'urbanites' into already congested low-income areas, one would ask whether on-plot options are still suitable. Findings from the research seem to be pointing to a different direction and suggesting that it may be time to look at other alternatives.

The cost of building latrine when (up to TZS350,000) is almost fifty percentage of the higher annual income of TZH720,000. Considering that only about twenty six percent of the four hundred and twenty people that responded have an annual income of TZH720,000 and above, it is an indication of why access to improved sanitation is low in low-income urban settlements of Tanzania. The income level therefore have an implication on the types of latrine technology that will be appropriate for low-income urban settlements.

5.3.5 Discussion of findings in relation to demand generation

The studies and publications on sanitation users over the past few years have provided better understanding of what motivates users to want and demand for a latrine and the potential barriers to acquiring their desired choices. Sanitation has always been promoted on the basis of its health benefit. However, literature shows that users install latrines for personal and/or family benefits. Commercial marketing principles have been suggested as a more sustainable approach for generating demand for sanitation at scale particularly in urban areas.

Applying commercial marketing principles of 4Ps to sanitation requires appropriate **products** (latrine options), at an affordable **price** (installation, operation and maintenance costs), and a **place** (information centres for options and SIPS) where it can be purchased, and **promotion** to stimulate demand and uptake (Obika et al., 2003). Analysis of house owners' data highlighted the lack of a place(s) that can provide information on latrine types and skilled SIPS as a key constraining factor (fig 9) to installing improved latrines (see appendix 5 for details).

5.3.6 Discussion of findings in relation to enabling environment for SIPS

This section discusses issues that are beyond the remit of SIPS but have major impact on their capacity to upscale and accelerate the delivery of improved sanitation in low-income urban areas. Very little sector-based literature addresses the questions of the enabling environment for small independent providers (SIPS) of sanitation in low-income urban settlements. It is a broad term generally used to describe policy, regulations and institutional framework provided by the public sector to facilitate service provision (Sykes, 1999). At the initial stage of the study, it was thought that SIPS could upscale the delivery of improved sanitation if their capacity was enhanced. The little existing literature and the analysis of research data indicate that the enabling environment (defined in section 5.2) is actually the most important factor for SIPS success, as demonstrated by the two case studies summarised in section 5.4.4.1.

The small amount of sector-based literature that exists on the enabling environment, identified the lack of appropriate public policy framework for the small private sector as a key constraint to their expansion, (Collingnon and Vézina, 2000, Sansom and Scott, undated); (Obed-Lawson and Njoroge, undated) and (Snell, 1998). Collingnon and Vézina (2000) in their study of ten African countries find a complete lack of communication between public authorities and independent providers of water and sanitation. They attributed this to the lack of professional association to represent independent providers but also to 'a studied lack of interest on the part of the authorities'. Although the study also looked at independent providers of sanitation, the emphasis was mainly on independent water supply providers and the more organised suction truck operators.

They also reported that public authorities were found to turn a blind eye to the presence of independent providers, neglecting to assign sites for proper disposal of sludge from latrines. The authors identified the shortage of public space as a specific constraint that arises from this lack of dialogue, which is similar to the findings of this research. Other aspects of weaknesses of public

policy identified by the authors include the lack of independent regulatory authorities, urban development policy vacuum, financial sector indifference, exclusion from public works contract and unprotected investment. The lack of a system for identifying or certifying SIPS with skills for appropriate latrines in low-income urban settlements has resulted in unskilled masons delivering poor quality latrines to unknowing households.

5.4 Implications of findings and areas of support for SIPS

In this section, the four key factors that have a major impact on SIPS capacity to upscale the delivery of improved sanitation that emerged during the research process are addressed. Suggestions on how to support SIPS and enhance their capacity to upscale improved sanitation are also addressed in this section. Capacity building is often taken to mean training; however, training on latrine construction alone is not sufficient for enhancing SIPS capacity to become more effective in their delivery of sanitation services. In order to maximise the ability of SIPS to upscale and accelerate the delivery of improved sanitation in low-income urban settlements, it requires the combination of the points listed below. This agrees in part with Moran and Batley (2004) suggestions but also shows that the enabling environment for SIPS cuts across issues other than policy and includes the following;

- i. Enhanced SIPS latrine delivery skills;
- ii. Appropriate latrines technologies;
- iii. Demand generation with key roles for SIPS; and
- iv. Enabling environment support.

The issues listed above were earlier considered in section 5.3 under discussion of findings and provided further insight into why the second part of the research hypothesis, that says that SIPS have the capacity to deliver improved sanitation at scale, has been disproved. These have not only formed the basis for defining specific steps to enhancing SIPS capacity but were also used to develop a series of guidance points to aid policy makers, urban planners, practitioners and

managers wanting to work with SIPS, and finally, they helped to fill the majority of the gaps identified in the literature review.

5.4.1 Implications in relation to sanitation delivery skills

The findings point towards the need to provide more training for SIPS. Though it is not feasible to trace and train all SIPS that operate in low-income urban settlements, training as many as possible through NGOs will have a multiplier effect, as they tend to copy each other. Findings show that although SIPS that are 'untrained' (*group A1.2*) were quick to copy from their 'trained' counterparts (*A1.3*) they sometimes went on to partner with them to install new latrines. Other areas of weakness amongst SIPS are their inability to carry out site assessment and suggest suitable latrine options (possibly using a catalogue) and estimate the quantity of materials required. The findings indicate that SIPS were unable to explain a new technology to a house owner (particularly female owners). Training of SIPS is a debatable issue amongst practitioners particularly for small independent sanitation providers because of their informal nature. Developing guide points for developing training materials is difficult and location specific but should cover key areas of weaknesses identified earlier.

The importance and potential impact of training cannot be over emphasised. SIPS even recognised the need for them to attend 'informal' training workshops to improve their knowledge of appropriate latrines and construction skills, as expressed in the box below. It is also important to note that training is only a small part of capacity building, which should consists of all other areas identified earlier developing appropriate latrine technologies and providing the enabling environment to support SIPS activities. The guidelines in the next sections are suggestions based on the research findings and have not been tested.

Field insight : SIPS training

P 7: trainednot supported(1).txt - 7:50 (409:413) (Super) Codes:[scaling up]

Fundi 10: A training workshop for fundis should be organized by the government in association with NGOs. After the training fundis will go back to their areas to work. Government or the NGOs who organized the training should follow up on their work to encourage them to utilize their training. When we look at the government structure, you find that even at ward level there is a health officer, but these people have not been close to the people. But if a group of fundis would get back to their area, they will be able to conduct classes on sanitation, and it will be easy to facilitate building of good latrines through these trained fundis.

Fundi 7: The govt. has failed in many aspects, therefore giving them the responsibility of organizing the training is not success guaranteed. The govt. should not be left to do each and everything. It is for the government to let the others to do it. Fundis living in those areas should be identified and given training on good latrines, and then taken back to their areas to educate the community on how to build good latrines.

5.4.2 Guidelines in relation to appropriate latrine technologies

A combination of the limited choices of on-plot technology and the low level of knowledge of the existing latrine options amongst SIPS strongly indicate the need to invest resources in developing appropriate latrine options for low-income urban settlements in response to the rising needs. The difficulties with emptying and sludge disposal further point to the need for enabling environment support in this and other areas discussed later in the chapter.

With the increasing urban population growth in sub-Saharan African countries, space will become an even bigger issue. The implications point towards the need to rethink the suitability of on-plot latrine options for high density low-income urban settlements. The big question is whether this phenomenon signals the end to on-plot sanitation as an appropriate option for low-income urban areas. If this is the case, what is an affordable and sustainable sanitation technology for these areas?

Developing and introducing appropriate low-cost options is beyond the capacity of the SIPS. There are evidences that SIPS have made various innovations on the existing technologies to suit house owner preferences even if with limited success. This implies the need for sector professionals and government to

work together towards developing and introducing new latrine options or modifying the existing ones to suit the challenging conditions in low-income urban settlements. It is important that the government is fully involved in the development of any new technology, particularly for low-income urban settlement, to ensure that the municipalities and urban planners are obligated by law to provide the necessary backup support for the sustainability of the sanitation systems.

Development of appropriate latrine technology/options should be based on user desired attributes. Findings from the research indicate that the life cycle of a latrine is the overwhelming important factor to house owners, followed by cost when it comes to choosing a latrine. Life cycle of latrines is measured in terms of the time taken for the pit to fill up before requiring emptying. Cost of a latrine is calculated based on the initial installation amount in addition to potential operation and maintenance costs. User perceptions and attributes of existing latrines have been used to develop the guide points in the box below. A simplified sewerage systems (also known as condominial sewerage) has been suggested as an appropriate option for low-income urban communities (Mara 2005). It not only satisfies the majority of the attributes in the box below, but can potentially resolve most of the problems of on-plot sanitation including emptying and sludge disposal, waste water management, and relieve house owners of the high cost of installing and maintaining pit latrines. It will also eliminate the inhuman jobs of emptying services providers (***typologies A2.1 and A2.2***), they can be retrained to provide other maintenance service for the simplified sewerage. It has been implemented successfully at a large scales in Brazil and in Pakistan.

Guide points: development of appropriate latrines

Based on user desired attributes for a latrine (not in any order)

- Long life cycle;
- Low costs of installation (<\$USD300), operation and maintenance;
- Requires little or no water for operation;
- Easy emptying access;
- Withstand high water table and flooding;
- Does not require specialised tools or moulds to fabricate lining materials or slabs/platforms.
- Limited or no smells and flies;
- Easy to use by all including children, old people, disabled, pregnant women and tenants;
- Requires a small space (pit and superstructure);
- Ability to combine as bathroom;
- Offset pit, where possible but not a priority.

5.4.3 Guidelines in relation to demand generation

The availability of appropriate latrines at affordable prices, and locations where people can access information on options and SIPS will not necessarily result in accelerated increase in the demand and uptake of improved sanitation. Unlike water, demand for sanitation needs to be stimulated. Sector-based literature outlined approaches for stimulating demand, which includes sanitation marketing.

Developing a sanitation marketing programme or other sanitation promotion approaches is beyond the skills of SIPS. It requires support from government, NGOs and even specialist input from outside the water and sanitation sector. SIPS by their informal nature cannot develop the capacity to generate enough demand necessary to upscale access to improved sanitation. Sanitation promotion is also an area that most governments are not willing to spend money on. It therefore falls on NGOs and donor agencies to continue to advocate for more funds to be channelled to sanitation promotion and to facilitate the buying in of necessary expertise from other sectors. Developing attractive marketing concepts; planning and implementing large scale promotion are all commercial marketing expertise and can be costly. This implies that sanitation promotion (e.g. sanitation marketing) requires partnerships between government, NGOs, commercial marketing agencies and donor agencies.

Evidence from literature indicates that NGOs are already undertaking this role but a more coordinated effort is required if it is to be scaled up.

An important difference worth pointing out in relation to marketing sanitation compared to other commercial products is that in sanitation, there is no finished product that can be purchased off the shelf. It requires interaction between SIPS and a household. Therefore it is absolutely important to create a specific step in the sanitation process that deals with ensuring that there are SIPS with the skills and enabling environment support to respond to the created demand. One practical approach for achieving this is to establish information centres that provide details of various latrines including cost estimates and lists of skilled and certified SIPS to install and empty latrines when required.

5.4.4 Guidelines in relation to enabling environment

The discussion of the research findings highlight two key components of the enabling environment (defined earlier in 5.2) that are important for maximising SIPS capacity to deliver improved sanitation at scale. These include, *pit emptying and sludge disposal support; and development and enforcement of appropriate policy and regulatory framework including certification of SIPS and enforcement of sanitation laws and regulations*. The literature review did not find examples of where the enabling environment for SIPS had been created. Implications of findings from the analysis of data and the literature review suggest the need for partnership between key stakeholders if SIPS are to upscale and accelerate the delivery of improved latrines in low-income urban areas (Sykes, 1999). This is supported by Collingnon and Vezina (2000) who suggested better dialogue between public authorities and SIPS as the first step towards improving public policy environment for independent water supply and sanitation providers.

i. Pit emptying and sludge disposal support

The complex nature of pit emptying and disposal makes it impossible for the thesis to come up with solutions to suit all. One possible solution may be to install secondary storage tanks. Small mechanical emptying trucks that can move around the narrow streets can then be used to empty latrines and the

sludge taken to the nearest secondary storage tanks. Instead of digging a new pit, house owners will pay for the contents of their latrine to be disposed of in the storage tanks.

House owners with pour-flush latrines can also be encouraged to connect directly to the tanks (small sewerage system) (Mara 2005). The funds collected will be used to pay for a large truck to take the sludge to the waste stabilisation pond. A similar system is being tried in low-income urban settlements of Maputo in Mozambique and worked reasonably well. The only problem is that municipal partners often fail to keep their part of the agreement and secondary storage tanks are often left full waiting for municipal trucks (author's personal conversation with SIPS in Mozambique and Scott undated). Paying for private large suction trucks will be more sustainable and independent. All these will require a huge amount of planning and organisation; moreover, many low-income areas are so congested that it may be difficult to find space to install a secondary storage tank.

Ensuring an effective and sustainable system for pit emptying and sludge disposal is a key factor in upscaling sustainable access to improved latrines. However, no amount of training can equip SIPS with the required capacity to deliver this service effectively. The costs (small suction trucks) and infrastructural support (waste stabilisation pond, secondary storage tanks, etc) required for hygienic and sustainable emptying and disposal are beyond SIPS and call for public authority support.

ii. Policy and regulatory framework

Some of the approaches suggested for establishing a favourable public policy framework for small scale providers include encouraging them to 'go formal' so that they can be recognised and regulated, contracting them for public sector work, (Collingnon and Vezina, 2000, Sansom and Scott, undated; Obed-Lawson and Njoroge, undated, Snell, 1998) and supporting them through creating an enabling legal environment, direct financial support and creating enabling credit and financial environment, (Moran and Batley, 2004). A good example is the Sulabh toilets in India where government provides the capital

cost and pays for water and energy, while Sulabh association manages the facilities. Direct financial support seems straightforward with public facilities but more thoughts are required on how it will work with individual household latrines. The authors also suggested that small-scale providers change their behaviour and improve networking amongst themselves, develop their strength through association and use it to lobby and defend themselves without creating cartels, which may set setting new entry barriers and restrict service areas.

When findings from the research are compared to the suggestions by various authors, it seems that supporting SIPS may be a more favourable approach for creating the desired enabling environment. Encouraging SIPS to 'go formal' may not necessarily benefit the urban poor, as they may begin to form cartels to fix their prices thereby limiting competition and flexibility that currently exist in the market. On the other hand, SIPS can be contracted for public sector projects to low-income urban areas, a phenomenon that already occurs.

When these suggestions are put in the context of SIPS in Dar es Salaam where the study was conducted, they seem almost impractical. Encouraging SIPS in Dar es Salaam to go formal will require immense external support from NGOs to gather and organise SIPS into a group. Experience has shown that organising SIPS into semi-formal/formal operations is not often sustainable, as they are used to working independently in a competitive market environment. This is demonstrated by the two case studies of urban sanitation projects with the involvement of SIPS in Dar es Salaam summarised in section 5.4.4.1. However, the public authority can establish and enforce appropriate sanitation policies and regulatory framework. A practical approach for regulating SIPS would be to establish lists of those that have attended training on low-cost sanitation at the various sub-ward offices. This is discussed further in the recommendations in chapter 6.

However, SIPS still need to be supported to function more effectively through providing training, developing appropriate latrine technologies, generating demand, establishing more hygienic systems for pit emptying and assigning locations for disposal of sludge, establishing systems for certifying skilled SIPS and enforcing sanitation laws and regulations. The findings strongly indicate

that maximising SIPS capacity to upscale and accelerate the delivery of improved sanitation is dependent on the authorities creating an enabling environment by establishing and enforcing sanitation policies, bye-laws and regulatory framework, and providing infrastructural support for pit emptying and sludge disposal.

iii. Implications in relation to certification of SIPS

It is a common practice for SIPS to undercut one another by charging much less for a job already quoted. Because it is an unregulated and free market, establishing standards for labour costs can be difficult. However, bringing some clarity into the amount of materials required for the various latrines will make the process of acquiring latrines easier for house owners.

The need to have a system (even if informally) of regulating SIPS is important for scaling up. It will not only limit the activities of 'bogus' SIPS but will make the process of identifying skilled and 'real' SIPS easier. Data from 411 cases indicate that house owners mainly identified SIPS through recommendations from neighbours (37%), friends/relatives (23%) and at building sites (20%). This is to avoid the problem of hiring unknown SIPS with no contact address who can run away with the advance payment as expressed by SIPS and house owners in the extracts from focus group discussion below.

Certification of SIPS can be done at the sub-ward level or any level of government closest to the people. In Dar es Salaam for example, every sub-ward has an office and representatives that are involved in day-to-day management of the various streets, including resolution of disputes amongst residents. A list of SIPS that have been trained in appropriate improved latrines with their contact details can be kept in the sub-ward office for house owners to access. The offices can also serve as latrine information centres where house owners can access catalogues showing the different latrines and their cost estimates. This type of certification is more likely to facilitate the weeding out of fake SIPS and assist in resolving conflicts between SIPS and house owners thereby making the process of acquiring latrines easier.

iv. Implications in relation to enforcement of sanitation laws and regulation

Enforcement of sanitation bye-laws and regulations is important to ensure that house owners install and maintain their latrine facilities. Most countries in Africa have sanitation bye-laws either on their own or embedded in other laws, often in the building regulation (Government of the United Republic of Tanzania, 2000). An example is in Tanzania where the main sanitation law is the '*Public Health Act*', which outlines 'sanitation nuisances' including latrines in poor conditions. The Ministry of Health also published '*Waste Management Guidelines*' which again includes excreta waste management (Ministry of Health, Government of the United Republic of Tanzania, 2003). Field investigations showed that neither the Public Health Act nor the guideline are being implemented in low-income settlements of Dar es Salaam.

SIPS recognise the importance of enforcing sanitation laws and regulations, and many highlighted the need for the government to guide planning in the low-income areas.

The non enforcement of sanitation bye-laws and regulations can impact on the ability of SIPS to upscale and sustain the delivery of improved sanitation. Though the demand for sanitation can be generated using approaches such as sanitation marketing, it sometimes requires the enforcement of bye-laws to encourage uptake. A case study from the author's town in Nigeria is a good example of where sanitation bye-laws were used to accelerate uptake, achieve total coverage and eradicate open defecation. The local authorities threatened to use existing bye-laws to prosecute house owners that do not have latrines and whose children are found defecating in the open. The message was disseminated through churches, community meetings and markets, and people were given six months to install and use latrines. Regular house inspections were conducted and fines were issued to non-conforming households. A combination of the embarrassment of being fined and the thought of losing money forced the majority of the house owners to install latrines and insist that all members of the household use them.

5.4.4.1 Case studies supporting the importance of creating an enabling environment for SIPS

Implications of the research findings strongly emphasise the important role of enabling environment support to enhance SIPS capacity to upscale and accelerate the delivery of improved sanitation. The findings show that the other three factors/areas for SIPS support (A, B and C – table 32) cannot be achieved without the corresponding enabling environment support (D). This shows that although SIPS are major players, they do not possess the capacity on their own to upscale and accelerate the delivery of improved sanitation in low-income urban settlements.

Two case studies further demonstrate the need for enabling environment support to maximise the capacity of SIPS. The case studies described below show the results of previous projects that attempted to build the capacity of SIPS to upscale the delivery of improved sanitation in low-income urban settlements but without the corresponding enabling environment support identified in this research.

The first case study entitled Buguruni Sanitation Workshop was a World Bank funded project that focused on training SIPS to build one particular latrine option and included promotion at a later stage of the project.

The second case study entitled Sanitation Marketing was a DFID-funded action research to look at maximising SIPS capacity to upscale sanitation delivery through training on different latrine options and support with demand generation. The contrasts and similarities between the two case studies are summarised in the table 32 below with details in appendix 6.

Table 32: Enhancing SIPS capacity to upscale provision of improved sanitation

Key factors for success	Buguruni Sanitation Workshop	Keko Muanga B Sanitation Marketing
Baseline studies	<ul style="list-style-type: none"> Formative research or baseline assessment was not carried out at the onset of the project. 	<ul style="list-style-type: none"> Carried out a detailed formative research to understand user desired attributes, motivations and constraints to acquiring improved sanitation.
Technology	<ul style="list-style-type: none"> Single latrine technology (VIP) was promoted. It was preconceived and not based on research on user behaviour and aspirations. 	<ul style="list-style-type: none"> Various latrine technologies (dry and wet options) were promoted based on the findings from the formative research.
SIPS training	<ul style="list-style-type: none"> Masons were trained on the construction of VIP latrines and on the use of small suction trucks. 	<ul style="list-style-type: none"> SIPS were trained on pit excavation, various types of pit, pour-flush and ecosan latrines. They were also given the necessary tools for the various latrines. Not much was done on latrine emptying.
Demand generation	<ul style="list-style-type: none"> Sanitation promotion was only introduced later on in the project when the demand for VIP latrines had not increased more than a year after the centre was established. 	<ul style="list-style-type: none"> Sanitation marketing concept formed the basis for the project and the process was initiated at the onset.
Delivery mechanism	<ul style="list-style-type: none"> People interested in VIP latrines were required to come to the centre and purchase their slabs and a mason to install the latrine. 	<ul style="list-style-type: none"> An information centre was established and equipped with information and sample components of the various latrines. The masons also have catalogues that show the various latrine and their costs.

5.5 Chapter summary

The major part of chapter 5 addressed findings from the research, which included testing the guiding hypothesis, discussing the findings and their implications and outlining guide points for supporting SIPS capacity development where possible. To summarise this chapter, a comprehensive visual representation of the four major areas of support for SIPS identified and discussed in the earlier sections has been presented (fig 9). The specific areas of support for the respective SIPS typologies (table 30, section 5.3.1) are summarised in table 33 in chapter 6.

Several issues were uncovered regarding the capacity of SIPS during the study, which require careful consideration. Capacity development should not just be about training but of utmost importance is creating an enabling environment to support SIPS in the areas of technology development, demand generation, pit emptying and disposal, certification of skilled SIPS and enforcement of sanitation laws and regulations. Without the public sector support and involvement of other stakeholders including users, NGOs and donor agencies, it will not be feasible for SIPS to maximise their potential as key actors in upscaling and accelerating access to improved sanitation in low-income urban settlements.

The assumption amongst sector practitioners that SIPS have the capacity to deliver improved sanitation at scale if their skills are enhanced and the demand for sanitation generated, using approaches such as sanitation marketing, is debatable based on the findings from the research. The review of literature (chapter 2) provided some information on latrine technology in low-income urban settlements, the nature of sanitation demand and approaches for generating demand, but very little on the knowledge, skills, and experiences of SIPS and even less on the enabling environment and SIPS. Findings from the analysis of field work data have helped to fill some of those gaps identified earlier. In particular, the thesis has thrown more light on essential areas in which SIPS need to be supported in order to enhance their capacity to scale the provision of improved sanitation services. The framework in figure 6 not only

outlines these essential elements (listed below) but fills the information gaps from earlier versions shown in chapter 2.

- Latrine delivery skills (A), this refers to training of SIPS on various latrine options, and other delivery skills;
- Latrine technology options/development (B), this refers to the identification, modification or development of appropriate latrine options;
- Demand generation (C), this refers to sanitation promotion activities to aid generation of demand and uptake of improved latrines amongst house owners;
- Enabling environment (D), this refers to emptying support that is particularly required from the government to facilitate the delivery of improved sanitation. This includes pit emptying and disposal support, certification of SIPS, enforcement of sanitation laws and regulations.

All the above components are interlinked and none of them can be left out if SIPS capacity to respond to the demand is to be enhanced. The need to identify and/or to develop appropriate latrine technologies is crucial for ensuring sustainable improved sanitation and should form a key part of SIPS training (B1).

However, technology development is way beyond the ability of SIPS and should be supported by government, NGOs and donor agencies with full user involvement (B1 – B4). This will ensure that user preferences and attributes are integrated and technology can be imported if necessary.

Demand generation activities such as sanitation marketing, latrine catalogues and establishment of latrine information centres are targeted at users, particularly house owners or their appointed decision makers (C1). Sanitation promotion requires support from NGOs, government and sometimes donor agencies especially if the sanitation marketing approach is adopted (C1 – C4).

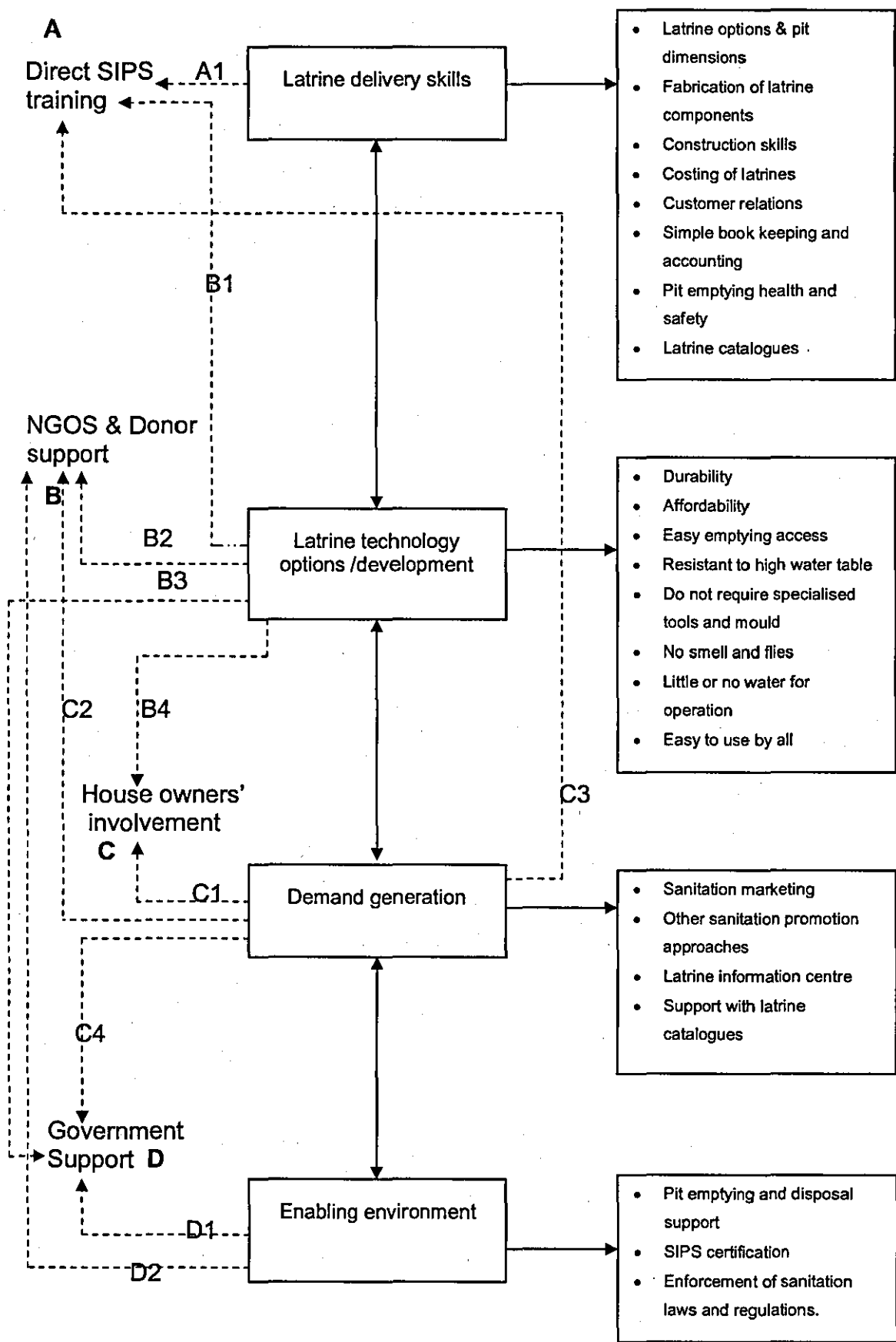
The enabling environment for sustainable improved sanitation includes infrastructural support for pit emptying and disposal, certification of trained SIPS

and enforcement of sanitation laws. This should in theory be the responsibility of the government but they often lack the resources (skills, and financial), hence the need for NGO and donor agency support (D1 and D2).

The SIPS typologies described in table 30 (5.3.1) require support in different areas based on the type of services that they provide. Table 33 in chapter 6 outlines those areas in which the respective SIPS typologies that provide services to low-income urban communities require support.

Finally, it is important to stress that SIPS cannot exist as an 'island'. Any capacity enhancement programme and SIPS involvement should form part of an urban improvement plan, otherwise, all the efforts will not be sustainable and their services will continue to be fragmented.

Figure 10. Visual representation of comprehensive capacity development for SIPS



Chapter 6: Conclusion and recommendations

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Chapter 6: Conclusion and recommendations

6.1 Chapter outline

This chapter concludes the thesis and considers the main points that came out from the study (section 6.2). Conclusions in relation to the research questions are presented in section 6.3. Recommendations based on the outcome of the research are segregated into five sections and presented in section 6.4. The general recommendations (section 6.4.1) outline measures and areas in which the respective SIPS (see typologies in section 5.3.1, table 30) can be supported in order to develop their capacity to upscale sanitation delivery. The roles that the various stakeholders can play are suggested in sections 6.4.2 (government); 6.4.3 (NGOs); 6.4.4 (Donors); 6.4.5 (SIPS). The final section (6.4.6) outlines areas for further research.

6.2 Conclusions

The importance of improving sanitation in low-income urban communities cannot be over emphasised. The growing urban population with the majority settling in the low-income areas adds to the already existing complexity of providing sanitation. This could potentially lead to more outbreak of diseases, have greater impact on children health and nutrition and overall development, and government of African countries spending limited resources on controlling epidemics.

This research has assessed the capacity of small independent providers of sanitation (SIPS) to upscale the delivery of improved sanitation in low-income urban settlements. The thesis identified constraints to scaling up SIPS services and four key areas of support that are necessary for SIPS to be able to upscale delivery of improved sanitation.

The review of literature helped to identify gaps in knowledge in relation to SIPS capacity. Although there was information on the activities of the informal and the private sector in water supply and sanitation, there were very few publications on small independent providers of sanitation (SIPS). The review revealed that

literature was weakest on SIPS knowledge and skills, and the enabling environment to support them in upscaling the delivery of improved sanitation in low-income urban settlements. This is in contrast to the general belief in the sector that SIPS have the necessary capacity to upscale service delivery and accelerate access to improved sanitation in urban areas.

Qualitative data collected through focus group discussions with SIPS and house owners and presented in the form of case histories formed the bulk of the data. These were reinforced by quantitative data from 427 questionnaires administered to house owners. The analysis of qualitative data using ATLAS-Ti software helped to define the typologies of SIPS (table 30), section 5.3.1), and identified constraints to their ability to upscale the delivery of improved sanitation. Findings show that these constraints are linked to each other, (see network view, fig 9, section 5.3.2) therefore cannot be treated in isolation. Based on this finding, four broad areas in which the capacity of SIPS will need to be enhanced were identified.

Discussion of the findings from the data analysis can be summarised at two levels. At a general level, the data provided an insight into the capacity of SIPS to deliver and maintain household latrines, which contrasts with the widely held view amongst practitioners. These contrasts were most obvious in the knowledge and awareness of latrine options amongst SIPS, constructions skills, sanitation delivery process, demand generation, and pit emptying and disposal.

The conclusions from the field work and data analysis are as follows:

i. Typology of SIPS

- Six categories of SIPS in three broad clusters were identified, of which six groups ('informally trained' and 'untrained'), provide sanitation services to low-income urban settlements with the greater majority falling into the untrained groups.
- A few of the SIPS who (group 1.3, table 30, section 5.3.1) have undergone training organised by NGOs had awareness and skills for constructing more latrine options than those who attended formal training in Technical colleges.

- The majority of the SIPS have learnt general masonry skills through apprenticeship but did not necessarily undergo training on latrine construction.

ii. SIPS skills

- Both trained and untrained SIPS (typologies A1.1–A1.3 and A2, see table 30) have limited knowledge of latrine technology options and were therefore restricted on the type of latrines they can deliver. However, 'informally trained masons' had better knowledge of more latrine options and construction skills than their untrained counterparts.
- The conditions of the informal settlements pose challenges during latrine construction and constitute health hazards to SIPS. These include unstable soil, high water table and the lack of space.
- Because sanitation jobs are not constant, SIPS often take on more than one job at any one time, concentrating on the higher paid job. This often causes distrust and problems with house owners.
- House owners are frustrated with the inability to obtain durable and good quality latrines, which they attribute to SIPS skills, lack of space, high cost of known 'good' latrines, lack of information on latrines and pit emptying difficulties amongst others.

iii. Existing latrine technologies

- Existing latrine options are either of the dry or wet technology with the majority falling into the first category. A sanitation ladder developed from the data analysis consists of seven steps, steps one to five are all various types of dry pit latrines while steps six and seven are the wet latrine (pour-flush and WC) respectively; and the ecological latrine (ecosan) also on step six.
- The cheaper latrines such as basket, tyre and drum latrines all have attributes that users dislike in a latrine (smell, short life cycle, flies, and impossible to empty) making them unattractive to house owners.

- Pit emptying can only be done manually and with immense difficulty because of the existing technologies, methods used and the lack of disposal facilities. This is a major barrier to sustaining access to improved sanitation in low-income urban settlements.

iv. Demand generation

- SIPS do not have any particular approach for generating demand for their services, rather, they depend on their previous clients' recommendations or their past jobs to get new clients.
- There are no information centres where house owners can go for advice on various latrines so they also depend on recommendations from their relatives, neighbours, and SIPS.
- The informal nature of SIPS and the lack of latrine information centres means that house owners find it difficult to identify skilled and reliable workers. This makes the process of acquiring and sustaining improved latrine a complex and difficult task.

Implications of the findings based on the analysis of data were applied to the overall framework of the thesis to address key areas of capacity gaps amongst SIPS. The hypothesis and key research questions were tested and the following conclusions were reached. The nature of urban sanitation provision means that SIPS capacity to upscale the provision of improved sanitation is constrained by the lack of an enabling environment and government support. Enhancing the knowledge and skills of SIPS is not enough to enable them to upscale and improve the quality of their services. They are limited by the lack of appropriate technology, inadequate demand for improved sanitation, and the lack an enabling environment (pit emptying and sludge disposal support, and effective policy and regulatory framework).

The conclusions of the thesis regarding the implications of findings for sector practitioners are as follows:

- SIPS should not be expected to achieve the ambitious goal of upscaling and accelerating access to improved sanitation to meet the MDG target and

without public sector support with their present level of knowledge and skills. SIPS can only achieve some success if their knowledge and skills are enhanced, and an enabling environment created to support them.

- There is need to rethink on-plot latrine designs and their suitability for low-income urban settlements considering the continuing urban population growth in Africa. Currently, space is an issue and will become an even bigger problem with the predicted urban population explosion.
- Scaling up and accelerating access to improved sanitation is not just dependent on SIPS knowledge and skills as mentioned earlier. There is a need to generate demand amongst users (house owners). Sanitation marketing has been suggested as an approach for achieving this, but unfortunately SIPS will never be in a position to also undertake sanitation promotion. It requires specialist and financial input, and ongoing external support.
- A key conclusion of the thesis is the significance and the elements of an enabling environment that are critical for enhancing SIPS capacity to upscale the delivery of improved sanitation services. Creating an enabling environment is not just about establishing and implementing appropriate policy and regulatory framework but providing support in the areas of; infrastructure to support pit emptying and sludge disposal, certification of skilled SIPS and enforcement of sanitation laws. All are very important for achieving sustainable access to improved sanitation.

6.3 Conclusions in relation to the research questions

In relation to the primary research question; *'do small independent providers have the capacity to upscale and accelerate the delivery of improved sanitation at a scale necessary to close the gap in coverage?'*, and linked to the conceptual framework, the research concludes that SIPS that deliver sanitation services in low-income urban communities as identified in section 6.1 (i) do not necessarily have the required capacity to upscale the delivery of improved sanitation. The research findings indicate that a number of factors contribute to this, including internal factors and external factors.

The internal factors identified are linked to inadequate knowledge and skills of improved latrines by SIPS particularly those mentioned in section 6.2 (ii). Considering that the majority of the SIPS that deliver services fall within these groups, it will be almost impossible to expect them to be able to upscale the delivery of improved sanitation in these settlements. An important conclusion in relation to SIPS skills is the limitations in terms of available latrine technologies for low-income urban settlements. The research concludes that the existing latrine technologies, which are mainly on-plot may no longer be suitable for high density urban settlements like the ones studied. The increasing population density and the resulting difficult physical conditions calls for the need to identify or develop new latrine technologies that take space and emptying difficulties into consideration. The other internal factor is the level and type of demand from house owners. The research concludes that the complex relationship between house owners and SIPS impacts on their capacity. The lack of trust due to costing and payment, SIPS completing work and delivering agreed services can potentially affect their capacity. Improving house owners' access to reliable information on latrine options, and contact for skilled SIPS will help resolve this issue.

Other important factors that are related to the external environment and requires external support from government and other stakeholders are as follows; infrastructural support for emptying and disposal; appropriate and functional sanitation policies; bye-laws; and regulatory framework including

certification of SIPS. The research concludes that SIPS capacity can only be enhanced if there is the enabling environment in the areas listed above.

SIPS capacity to upscale the delivery of improved sanitation in low-income urban settlements is therefore dependent on improving their knowledge and skills of latrine technologies, developing appropriate latrine technologies, supporting with demand generation and creating the enabling environment.

6.4 Recommendations

This section puts forward five sets of recommendations. The first is a general recommendation that suggests major areas in which SIPS can be supported in order to enhance their capacity. The remainder suggests the roles that the government, NGOs, donors, and SIPS can play, and has come out from the discussion of the findings related to the key research questions in section 5.3. The thesis concludes by recommending areas for further research based on gaps identified from the entire research.

6.4.1 General recommendations

The thesis identified four key constraints to SIPS capacity to upscale the delivery of improved sanitation in urban poor settlements. They include the lack of appropriate sanitation technologies; SIPS limited knowledge and skills; demand generation; and enabling environment. Details of the four issues and suggestions for improvements were discussed in section 5.3.2. It is important that these are taken seriously by policy makers and urban planners if SIPS are to be able to upscale the provision of improved sanitation.

- The respective SIPS typologies described in table 30, section 5.3.1 require training and support in different areas depending on the type of service that they provide. Table 34 outlines the different areas that the respective SIPS can be supported.
- However, improving the four elements mentioned earlier in isolation is not enough, it is important that they are integrated into an urban improvement plan. Collingnon and Vézina (2000) pointed out that one of the obstacles to

the expansion of SIPS services is the urban development policy vacuum. Considering that Africa's urban population growth is predicted to more than double by 2050, there is a consistent absence of policy to deal with this growth. Access to sanitation and water supply in low-income urban settlements is mainly driven by needs rather than as a result of formal policies (Allen et al., 2006).

- Where any plan is developed and implemented it usually does not recognise SIPS. It is strongly recommended that policy makers and urban planners integrate SIPS in any urban improvement plans. This recommendation is supported by Allen et al (2006) where they noted that the 'key to structural improvements in water and sanitation is with the recognition of the services provided by the informal sector and articulating them into formal system under new governance regimes'.

Table 33: Different areas for support

Area for capacity building		SIPS typology (based on table 6 in 5.3.1)					
		A1.1	A1.2	A1.3	A2	B3.1	C6.1
Sanitation delivery skills	Increased awareness of the components and functioning of various latrine technologies	X	X	X	X		X
	Training on construction of appropriate latrines	X	X	X			
	Training on customer relations and effective service delivery	X	X	X	X	X	
	Training on latrine maintenance, emptying and sludge disposal				X	X	
	Costing of latrines including materials and labour	X	X	X			
Latrine technology	Development of appropriate latrine technologies.	X	X	X			
	Development of maintenance and emptying mechanisms	X	X	X	X	X	
Demand generation	Training on the use catalogues to promote various latrine options.	X	X	X			
	Sanitation marketing	X	X	X			X
Enabling environment	Policy regarding emptying and sludge disposal	X	X	X	X	X	
	Regulatory framework	X	X	X	X	X	

6.4.2 For governments (policy makers and planners)

- Establish and implement appropriate sanitation policy and regulatory framework for SIPS. This is a very important first step towards improving sanitation with SIPS involvement, particularly in low-income urban settlements. Although some countries have sanitation policies, they are often weak and scattered over numerous institutions and usually do not recognise SIPS. The policy should clearly spell out institutional responsibility for sanitation, the role of SIPS, and a clear implementation strategy.
- A regulatory framework is required specifically for sanitation providers, as integrating it with water supply has not been very successful. An independent unit within the water supply and sanitation regulatory body is a good way to ensure that sanitation gets the attention that it deserves. The regulation will cover what SIPS need to do in order to be recognised, such as attending training on low-cost sanitation; registering with the local government (e.g. sub ward government offices in Dar es Salaam) as a form of certification to enable house owners to access skilled SIPS. The ward government offices are already the first point of information regarding things considered official by the residents of the study areas, hence the suggestion that they may also be best placed to coordinate SIPS certification. .
- The government should be involved in the development and trial of any new sanitation technology for low-income urban settlements. This is very important for ensuring that the municipalities support any future maintenance requirements for the technologies.
- Recognise low-income urban settlements and include them in urban improvement plans. It is strongly recommended that policy makers and urban planners integrate SIPS in any urban improvement plans.
- Contract NGOs to provide periodic training on appropriate low-income sanitation options and develop a system for ensuring that SIPS that provide sanitation service attend this training at least once. One way of doing this is to link attendance of training to SIP certification.

- Support demand generation using appropriate approaches through their network of local government representatives and offices.
- Provide infrastructural support for emptying and sludge disposal. It is widely appreciated that waste treatment plants require a large capital to install and it is not expected that there should be one close to every low-income settlement. However, the government could carry out upgrading of informal settlements and provide secondary storage tanks in the respective settlements. House owners can either be allowed to connect directly to the tanks or dispose of the contents of the pit latrines for a fee. Emptying and disposal of sludge from the storage tanks can be contracted and paid for by house owners through monthly sanitation levies.

6.4.3 For programmers and practitioners (NGOs)

- Prior to developing training programmes for SIPS, there is a need to invest in identifying appropriate latrine technologies/options that can then form part of the training. This can be done by conducting in-depth user studies to understand key attributes and preferences. Appropriate latrine options can then be identified through the modification of existing options or importation of new technologies. NGOs are a good group to facilitate studies to support the development of new latrine technologies. Findings from the research indicate that NGOs have achieved some success in training SIPS, judging by the fact that all those that attended training organised by NGOs had better knowledge and skills for latrines than their untrained counterparts.
- With lack of space and problems of emptying being key barriers to acquiring improved latrine in low-income urban areas, it is necessary to spend time in planning and implementing the training of SIPS. Training sessions should include cost effective pit dimensions and lining materials, safe pit excavation and lining in unstable and high water table areas.
- Capacity building for SIPS goes beyond training; emphasis should also be on demand generation. This is an important area and no amount of training, without external input and continuous support, can prepare SIPS to perform

this task. Sanitation promotion should go hand-in-hand with the training of SIPS. Implementing agencies should invest resources in appropriate sanitation promotion approaches such as sanitation marketing, which has proved to be effective for generating demand in urban areas.

- Aspects of the enabling environment, which include infrastructural support for emptying and disposal, and review/enforcement of sanitation bye-laws are equally important for scaling up access to improved sanitation. Without the necessary infrastructure to facilitate emptying and disposal, access to improved sanitation cannot be sustained. Disposal facilities such as waste stabilisation ponds require huge capital to construct, which many Africa countries cannot afford or do not see as a priority. NGOs and donor agencies need to continue to advocate for disposal facilities to support the delivery of improved sanitation in low-income urban settlements.
- Sanitation laws and bye-laws exist in many African countries but are not enforced for several reasons, including weak government institutions and confusion on roles and responsibilities. Sector practitioners including NGOs and donor agencies need to advocate, support and possibly finance the implementation of these enabling environment issues. Sanitation provision, unlike the water supply, is a complex and less popular issue amongst governments and users alike, and therefore requires consistent push and input from sector practitioners.

6.4.4 For donors

- Sanitation improvement particularly in urban areas is a daunting task facing many municipal governments in sub-Saharan Africa. The increasing urban population and difficult environmental conditions of low-income settlements make it even harder to provide improved sanitation services. Donors cannot only play a major role in providing financial support required for infrastructure through low-interest loans and grants, but can also provide technical support.
- Donors command some degree of influence due to the financial and other support that they provide to governments. They can use this influence to

advocate for sanitation to move up the priority ladder of government, particularly urban sanitation and involvement of SIPS.

- Support the development of new sanitation technologies such as simplified sewerage, provide access to information, and facilitate exchange visits to areas where they have been implemented successfully.
- Provide direct support to NGOs to help set up demand generation activities and facilitate the trial of any sanitation technology.

6.4.5 For SIPS

- SIPS also need to play some roles in ensuring that their capacity is enhanced to upscale the delivery of improved sanitation in low-income urban settlements. The first step is that they should form a semi-formal group or association to enable them to have a voice to represent them in government and other stakeholders' forums.
- The association will also form the platform for working with SIPS and for ensuring that they participate in any training organised on appropriate low-cost latrines.
- SIPS can ensure that members abide by the regulations and sanitation laws particularly with regards to installing new latrines, pit emptying and sludge disposal.
- Establish mechanism for house owners to identify certified SIPS, and for settling any misunderstandings during installation or maintenance of latrines.
- More importantly SIPS should participate in developing any new technology because of their immense knowledge and experiences of providing sanitation services in low-income urban settlements. They should also be involved in sanitation marketing.

6.4.6 For further research

- Due to limitation in resources, it was not possible to cover institutional issues, which is an important part of the puzzle. Engaging SIPS in scaling up the delivery of improved sanitation in low-income settlements in a sustainable manner requires state institutions with capacity. Although NGOs have been shown to play important roles in working with SIPS to deliver sanitation, it is necessary that government institutions take the lead role. In Tanzania and in many African countries, the responsibility for sanitation is often spread across various institutions. Little is known about the capacity of these institutions to support and to partner with SIPS to upscale sanitation delivery. Assessment of various institutions involved or linked to sanitation provision is therefore necessary to understand their strengths, weaknesses, opportunities and threats.
- Enabling environment support has been pointed out as a key factor in maximising the capacity of SIPS to deliver improved sanitation at scale. Although this thesis has identified key aspects of the enabling environment that are important, detailed research is required on existing sanitation policies and regulatory framework, and how they impact on SIPS.
- Analysis of data indicated that existing on-plot latrines may no longer be suitable for low-income urban settlements, and off-plot technology also has its own issues due to the location of disposal facilities. There is a need to investigate other appropriate technologies for low-income urban settlements taking user attributes and challenges with urban poor areas into consideration.
- Safe emptying and disposal of sludge is generally said to be an issue and have impact on achieving suitable coverage of improved sanitation in low-income urban settlements. There is still little information on safe, effective and efficient methods of managing excrement disposal in these settlements.

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Appendices

1. Recruitment questionnaires

1.1 Recruitment questionnaire for Small Independent Sanitation Providers (SIPS)

Name of settlement: _____ Date: _____

Name of Interviewer: _____

Good morning/afternoon, my name is From an organisation that is conducting research on sanitation. Currently we are doing a research on toilets in this area. We would appreciate if you will respond to our questions.

Are you a mason? Yes ☐ No ☐ (If not end the interview)

We are looking people who are involved in toilet construction in this area, Have you been involved in toilet construction for the last three years?

Yes ☐ No ☐ (If not end the interview)

What type of toilet have you built?

Drum toilet	<input type="checkbox"/>	Ecosan	<input type="checkbox"/>
Pit Toilet	<input type="checkbox"/>	San Plat	<input type="checkbox"/>
Sink Toiet	<input type="checkbox"/>	Pour flush	<input type="checkbox"/>

We will be having group discussions with toilet building masons, would you like to participate in this discussion?

The discussion will be held at VETA chang'ombe on _____ at _____ o'clock _____ morning/afternoon. Drinks and bites will be provided.

Thank the respondents for agreeing to answer the questions.

INVITATION

You are invited to participate in discussion on issues related to toilets for toilet builders. Please bring this invitation letter with you.

The discussion will be held on: Date _____ month _____ 2005.

Venue; VETA, Changombe , Time _____ Morning/Afternoon.

1.2 Recruitment questionnaire for house owners

Name of settlement: _____ **Date:** _____

Name of Interviewer: _____

Good morning/afternoon, my name is From an organisation that is conducting research on sanitation. Currently we are doing a research on toilets in this area. We would appreciate if you will respond to our questions.

Do you have a latrine? Yes ☐ No ☐ *(If not end the interview)*

We are looking people who are have built latrines in the last eight years, is your latrine 8 years or less?

Yes ☐ No ☐ *(If not end the interview)*

What type of latrine do you have?

Drum toilet ☐

Ecosan ☐

Pit Toilet ☐

San Plat ☐

Sink Toiet ☐

Pour flush ☐

(Select the agreed quota for each latrine option)

We will be having group discussions with toilet building masons, would you like to participate in this discussion?

The discussion will be held at VETA chang'ombe on _____ at _____ o'clock _____ morning/afternoon. Drinks and bites will be provided.

Thank the respondents for agreeing to answer the questions.

INVITATION

You are invited to participate in discussion on issues related to toilets for toilet builders. Please bring this invitation letter with you.

The discussion will be held on: Date _____ month _____ 2005.

Venue; VETA, Changombe , Time _____ Morning/Afternoon.

2. Focus group discussion guides for house owners

2.1 Focus group discussion guide for house owners with latrines

Section 1: Introduction

Thank you for attending the session, my name is
and my colleague is We are here on behalf of
an agency that conducts research on consumer behaviour. We are here today to talk
about sanitation and to understand the how people live and conduct their daily activities in
your community. The information we get from you will be kept confidential. I will be asking
the questions and my colleague will be taking notes. We would also be recording the
proceedings using audio and video recorders. There are also other people that will be
next door observing the proceedings.

Feel free to tell me when you do not want any part of your discussion recorded. I would
like everyone to contribute to the discussion please try to give others chance to also make
contributions. If you have any questions, please feel free to ask me now.

Section 2: Icebreaker

Please introduce your self and what you do so that we can take note of those who are
present out the people that were invited.

Thank you all very much for coming today; I would like to start with understanding the
living conditions.

In the place that you live, what are the main issues that affect you personally as far as
living conditions are concerned?

If you win bingo, what will you do with the money?

Section 3: Awareness (knowledge and exposure to household toilets)

4. What types of toilets do you know of, please describe them.
5. What are the key differences between the toilets that you have just described?
6. How did you come to know about these toilets?

Section 4: Usage (experience and decision to build household toilets)

7. What type of toilets do you have/use in your houses, please describe your toilet, (pit
depth, squatting plate, structure)
8. How long have you had your toilet and was that your first toilet

9. What types of materials did you use in building the different parts of your toilet, (pit lining, squatting plate, inside, and super structure)?
10. I would like to understand how you came to make the decision to build a toilet in your house?
 - Who was involved in making this decision?
 - What really pushed you to decide finally to build your own toilet?
 - Were there other people who influenced you to make this decision?
 - Do you remember the things that you considered when you were trying to decide about building a toilet in your house?
11. Can you explain more about how the toilet was built and by whom?
 - From where, or from whom, did you get the ideas for the construction method/style of toilet to build?
 - Who made the design/drawings/plans?
 - Did you have any opportunities to see other toilets before you built yours? Where, what kinds, whose were these toilets?
 - Did you consult anyone for advice concerning the construction methods?
12. What did you consider in choosing the style of construction?
 - What factors influenced you in these design and construction choices? (E.g. depth and dimensions of the pit, materials used to construct the structure, roof, door, slab, etc.)
 - When you first built your toilet, how long were you expecting the toilet to last?
13. Did you encounter any difficulties or problems while constructing your toilet?
 - E.g. with the type of soil or the water table, with finding a mason, getting materials or the necessary equipment for building?
14. How much did it cost to build your toilet? Who paid these costs?
15. If money had been a problem (e.g., you had had less than you did) at the time you were building your toilet, how would you have changed the construction and style to reduce the cost?
 - What aspects of the toilet, its performance and operation, and its usage, are the most important to you?
 - What aspects are the least important?

Section 5: Operation, performance and maintenance

16. Have you ever had any problems with the toilet since it was first built?
 - How were any problems resolved?
 - Have you ever made any repairs or done any maintenance to the toilet?
 - How were any repairs paid for?
 - Had you been aware of this kind of problem before you built your toilet?
17. Regarding the pit, do you or others who use this toilet, put anything else in the pit besides human faeces?

- What about anal cleansing materials?
- What about products or things added to the pit to maintain it last longer or just before emptying?

18. What kind of regular cleaning or maintenance is done for the toilet?

- Who does it, how often? How is it organised?
- What difficulties have you had for keeping the toilet clean?

19. Is any water used in the toilet? Does rain or the other water (e.g. bathroom) ever enter into the pit? (excluding the WC)

Section 6: Usage by household, compound, neighbours, visitors and reasons for preferences

20. Who among the members of your immediate family use this toilet?

- Who among the people members of the compound use this toilet? (Owner/tenant houses only).
- At what times of the day/night do they use the toilet?
- Do you keep the toilet locked or not? Why? Why not?

21. Do you allow any neighbours from outside the building to use the toilet?

- Is this regular? Why? What is the arrangement for this?
- Do you use this toilet for any other purposes or functions apart from defecating?

Section 7: Emptying/desludging, and duration

22. How much more time (years) do you think your toilet pit will last before it is full? What about the slab and the superstructure?

- What will you do when the pit is full? When slab broken, superstructure falls down?

23. Have you ever emptied the pit (or septic tank)? If yes how and how much did it cost?

- What do you think of this idea to empty the pit manually?

Section 8: Motivation, (dis)satisfaction of having a household toilet

24. In your own opinion, what are the real advantages for you, personally, of having a household toilet?

- What about for other members of your household?
- Have you found any disadvantages or inconveniences or problems of having a household toilet?

25. Are there any things that you are dissatisfied with regarding your toilet and its usage, operation, performance that you would like or wish to change?

- Have you ever thought of changing anything with the design and operation?

26. If you hadn't installed this toilet, how would your household manage?

- get approximate distance from the house to most likely alternative site for men, for women, for children to defecate without toilet at home
- In your opinion, what are the inconveniences \ negative aspects of using this other place(s) to defecate?

27. What are all the possible places in this neighbourhood/area/town for one to defecate?
- (ask to identify all the possible alternative places for the adult members of the household to use)
 - For other residents of the town/area who do not have a toilet at home, what are different places they use to defecate? Daytime? Night times?
 - Alternative places
 - Distance to house
 - Conditions at site
 - Aspects/Qualities that influence choice of this site
28. In looking for or choosing a place to defecate, what are qualities or aspects of the place do you consider? What qualities are most important to you? (see a list of possible qualities below):
- the distance
 - the concern for safety/ the presence of insects, animals, or other pests
 - the risk of any dangers
 - the privacy
 - the presence of houses nearby or next to the site
 - the weather (whether it is raining, hot, sunny, cold?)
 - the condition of the path/route between here and the alternative site
 - the presence of people nearby
 - the smell
 - the usage of the site/place by others before, after me, or at the same time (which others? Anyone, other men, other women, certain members of my family)
 - the availability of material for anal cleansing
 - the time of day or night
 - the cleanliness of the site
29. Among these other alternatives to your household toilet, which ones would you choose to defecate? (from those places identified in 25) would you consider using, would you refuse to use?
30. In this area, are there places known and maintained by people for defecating?
- Is there anything done to maintain or cleanup these places?
31. Have there ever been problems with these public places to defecate?
- Are there places that were used in the past for defecation that is no longer used?
 - In your opinion, do you find anything bothersome/inconvenient with using these other places to defecate?
32. Could you compare the advantages and disadvantages for you and your household between: having a household toilet, and not having one?

Section 9: Indicators of wealth

18. In many places, people can be divided into groups according to what they have (e.g. rich, poor, middle, etc)
- What groups would you place different people in your area?

- In your opinion, what percentage of people is in each group?

Section 10: Communication channels

19. How do you get information on new products in this area? (e.g. soap, beer, etc)

- What percentage of houses has radios in this area?
- What radio stations are popular?
- What programmes are popular?
- What times are they broadcasted?

20. How many of you have a TV? Are there many houses with TV here?

- Which station do you get clearly in your area?
- What time do most people watch the TV?

21. What news paper is popular?

22. Where do men, women, youth and children gather in good numbers? (e.g. hospital, football matches, cinema, bar, market, etc)

- *Days/ time*

Close the section by thanking everyone who participated in the discussion for their very useful contributions.

2.2 Focus group discussion guide for house owners without latrines

Section 1: Introduction

Thank you for attending the session, my name is and my colleague iswe are here on behalf of an agency that conducts research on consumer behaviour. We are here today to talk about sanitation and understand how people live and conduct their daily activities in your community. The information we get from you will be kept confidential. I will be asking the questions and my colleague will be taking notes. We would also be recording using audio and video recorder. There will be other people next door observing the proceedings.

Feel free to tell me when you do not want any part of the discussion recorded. I would like everyone to contribute to the discussion please try to give others chance to also make contributions. If you have any questions, please feel free to ask me now.

Section 2 Ice breaker

Please introduce yourself and what you do so that we can take note of those who are present out of the people who were invited.

1. Thank you all very much for coming today; I would like to start with understanding the living conditions in your place.
2. In the place that you live, what are the main issues that affect you as far as the living conditions are concerned?

If you win bingo, what will you do with the money?

Section 3: Awareness (Knowledge and exposure to household toilets)

3. What types of toilet do you know? Please describe them.
4. What are the key differences between the toilets that you have just described?
 - How did you come to know about these toilets?
 - Where did you see them?
 - Do you know other types of toilets which are found in your area
 - How many?
 - Who owns them?
 - Who are they? (Relatives, neighbours or customers?)

Section 4: Usage

5. Can you explain more about the toilets situation or other places where people can go and defecate in your place?
6. Can you explain types of toilets which you have ever used? Where?
7. What type of toilet do you normally use?
8. Where are these toilets?
9. What do you like about these toilets?

10. What did you dislike about these toilets?

Section 5: Satisfaction / dissatisfaction of not having a household toilet

11. What are all the possible places in your area where one can go to defecate?

- (ask them to identify all possible alternative places for all members of the household to use)

12. For other residents in the area who do not have toilets in their houses where do they go?

- Day or Night?
- Alternative places
- Distance from the house
- The situation in the area
- Attributes/ things which makes them to decide to use that place

13. In looking for or choosing a place to defecate, what qualities or aspects do you consider?

- What qualities are most important to you? (see list of possible qualities below)
 - the distance
 - the concern for safety/ the presence of insects, animals or other pests
 - the risk of any dangers
 - the privacy
 - the presence of houses nearby or next to the site
 - the weather, is it raining or hot sunny, cold the condition of the path /route between here and the alternative site
 - the presence of people nearby
 - the smell the usage of the site/place by others before, after me, or at the same time (which others? Anyone, other men, other women, certain members of the family)
 - the availability of materials for anal cleansing
 - the time of day or night
 - the cleanliness of the site

14. In this area are there places known and maintained by people for defecating?

- Is here anything done to maintain or clean up these places?

15. Have there ever been problems with these public places?

- Are there places that were used in the past for defecation that is n longer used?
- In your opinion do you find anything bothersome/ inconvenient with using these other places to defecate

Section 6: Motivation for a household toilet

17. In your opinion, what are real the advantages for you, personally of having a household toilet?

- What are the most important advantages
- What are the least important advantages
- Have you found any disadvantages or inconveniences or problems of having a household toilet?

23. How do you and your family manage without a toilet?
24. Where do you go? Other alternative places? (day/night)
25. What about for other members of your family? What is the distance from the house?
26. What are the real advantages for you of these alternative places?
27. What about for other members of your family?
28. What problems/ inconveniences do you encounter personally from using these places?
29. What problems do your family get by using these places?
30. Do you find any inconveniences or anything bothersome with using these other place for defecating which will influence you to build a toilet? (which is the most important, next, and the last one)
31. Among these other alternatives to a household toilet, which ones would you prefer? Where do you prefer? Why?

Section 7: Intention to build a toilet

- Have you ever thought of building your own household toilet? If no why?
 - When did you think or try?
 - What made do you to think of having your own toilet?
 - What stopped you from building your own toilet?
 - If you would have to build your own toilets what attributes will have? Describe
 - Why are they important to you?
 - What will be the impact of not having these aspects?
32. What type of toilet is most popular n this area?
 - Why do you think this is the most popular type of toilet?
 - In our opinion, what problems/inconveniences of these popular toilets which will make you not to build either of them? (e.g. usage, performance and operation).
 33. Do you expect to have any problems with building your toilet?
 - Technical problems, materials, high water table, rocks
 - Space, neighbours
 - Building permit from street government or other inconveniences
 - Usage, cleaning, desludging/emptying
 - Problems with family members/ tenants in providing cash contributions
 34. Have you ever done any maintenance to your house since it was first built?
 - If yes, how did you pay?
 - If no, how did you pay for the costs of building your house
 - Where or in what ways do people get loans for building or maintaining their houses?

35. If you were supposed to build your toilet after one year how would pay for the costs?
- Do you know any ways of getting a loan? Where and how?
 - Is there any assistance from government or other organisations for building a toilet?
 - Have you ever consulted them? What happened?
36. If you build your own toilet who will use it?
- Children, neighbours, tenants? If no why?
37. In Your place, how do people perceive people who have toilets in their houses?
38. Do you have any expectations of building your toilet next year?
- If I visit you this day next year, will you have started to build your toilet?
 - What major problem will you have resolved by building your own toilet?
 - Why is it important to solve this problem?
39. Do you know a fundi or any one who can build a toilet? How did know him?

Section 9: Indicators of wealth

40. In many places, people can be divided into groups according to what they have (e.g. rich, poor, middle, etc)
- What groups would you place different people in your area?
 - In your opinion, what percentage of people is in each group?

Section 10: communication channels

41. How do you get information on new products in this area? (e.g. soap, beer, etc)
- What percentage of houses has radios in this area?
 - What radio stations are popular?
 - What programmes are popular?
 - What times are they broadcasted?
42. How many of you have a TV? Are there many houses with TV here?
- Which station do you get clearly in your area?
 - What time do most people watch the TV?
43. What news paper is popular?
44. Where do men, women, youth and children gather in good numbers? (e.g. hospital, football matches, cinema, bar, market, etc).
- *Days/ time*

Close the section by thanking everyone who participated in the discussion for their very useful contributions.

3. Focus group discussion guide for SIPS

Section 1: Introduction

Good morning, and thanks for taking time to talk with us. My name isand my colleague is We are conducting a research on sanitation particularly on the process of installing latrine. The information will help us to advice the government and NGOs on how to work with you in order to improve your services. This could potentially motivate more households to invest in installing hygienic latrines thereby increasing your business.

You have been chosen because you are fundis and have built latrines for people within the last 12 months. We want to understand the procedure and your experiences with installing latrine for people.

We are here to have a discussion, to listen and ask questions for clarification, and ensure that you have the opportunity to share your views and experience. There is no right and wrong answers, please feel free to share your experience and point of views. We are interested in both negative and positive comments, and sometimes the negative comments are the most helpful, as it will help us to understand where improvements are needed.

We are recording the session because we don't want to miss any of your comments. Your comments are confidential and no names will be included in any reports.

NB: For record purposes, mention

Fundi No:, Street name:, Municipality: ,.....

Section 2: Icebreaker

- Is there anything you would like to ask us before we begin?
- Could you tell us about your fundi work in general?
 - where you live, where you work and why?

Section 3: Knowledge/awareness)

Latrine options:

- What types of latrine do you know of? Please describe them?
 - Pit (dimension), lining, platform, walls (structure)
 - What types of materials do you know of that is used for lining, platform, superstructure?
- What are the key differences between the latrines that you have just described?

- How did you come to know about these latrines?
 - Where did you see them?

Emptying and disposal

- What is the level of the need for latrine emptying in the areas where you work?
- What methods are you aware of that are used for emptying latrines at various times of the year?
 - manual, mechanical, hole in the pit (self emptying)
- Are you aware of the dangers with the various methods of emptying latrines?
- Which methods do you know of that is used for sludge disposal?

Demand and supply mechanisms

- How do customers demand for latrines?
 - where do they go for information on types, cost and who can build them?
 - What knowledge do they have about latrines?
- What is the level of demand for latrines?
 - When is the demand high or low during the year and why?
- Are you aware of any method used for raising households' demand for sanitation latrines?
 - Used by fundis, government, NGOs, etc.
- How do households demand for latrines and how are the latrines supplied?
- Are you aware of what customers need in a latrine?

Enabling environment

- Are you aware of any laws relating to latrines, emptying and disposal?
 - Do know of any regulation on the type of latrines that can be built for household use?
 - Are there any guidelines to which you are required to follow before you start latrine construction?
 - Do you know if permit is required before a latrine can be build? (what is the procedure for this permit and where can you get it)?
- Do you know of any regulation regarding latrine emptying and disposal of sludge?
 - Are you aware of locations approved by the government where sludge can be disposed of? Where are they?
 - Are you aware of procedures for disposing sludge at these locations? (cost, opening time, etc).
- Are you aware of any laws relating to informal private sector services in sanitation?
 - Do you need to register with the government before you can work as fundi?

- Is there a government certification for fundis in general, latrine fundis in particular?
- Are you aware of government and NGOs involved in sanitation?
 - What are they doing and how? (types of latrines)
 - Where are they working? How long have they been there?
 - How did you know about them?
- Are you aware of any training or workshop on latrine construction organised for fundis like you?
 - Who organises the training?
 - When, where, and for how long?
 - Are fundis expected to pay? How much and to whom?
- Do you know of the roles of the government and NGOs in relation to sanitation?
 - how did you learn about this?

Section 3: Practice (*usage/frequency – skills/experience*) - motivation

Latrine options:

- Which of these latrines have you built?
- Can you describe the last three latrines that you built?
 - What are their names locally?
 - What is the pit dimension?
 - What materials did you used for lining the pit? Squatting plate? Super structure? (Sand cement ratio)
 - Total costs of latrine?
- What are the key differences between the three latrines that you built? Why?
- How did you learn to build these latrines?
 - How long did you train for?
 - Have you attended any formal training? (when, where, by whom?)
 - Who organised the training and how long did it last?
 - Did you pay or receive payment for the training?
 - What other support did you get after the training?

Emptying and disposal

- What other services do you offer to households after completing their latrines?
 - Do you empty full latrines?
- How are latrines emptied?
 - Manual or mechanical? Why?
 - Who empties latrines?
 - How much does it cost to empty a latrine and how is the cost arrived at?
 - How often are latrines emptied?
 - What periods is the demand for emptying high? Why?
 - Do people empty their latrines as soon as if fills up? If no, why?

- Do you have any problems with emptying latrines?
- Can you tell us where we can find houses with full latrines ready to be emptied?
- What problems do encounter when emptying pits?
 - Ventilation problems, accessibility, transportation of sludge, protective gears, social problems?
- How and where do you dispose of the sludge from the latrines?
 - Do you have any problem disposing of waste?
 - Do you pay to dispose waste? How much?

Demand and supply

- How many latrines did you build in the last six months?
 - How many do you usually build in a year?
 - Which periods of the year do you build more latrines and why?
 - What is your motivation for building latrines?
- What types of latrines do your customers demand for most?
 - Why?
 - What things do you like about building these latrines?
 - What things you dislike about building these latrines?
- How do you get new customers?
 - How do customers know the types of latrines that you can build?
 - Do you experience any problems in getting new customers?
 - Why do you think this problem occurs and how can it be resolved?
- How did you get the job for the last three latrines that you built?
 - Direct contact by customer?
 - Through government/NGO
 - Individual marketing of services?
 - Referral by previous customers?
- Could you tell us the process that you went through with the last three latrines, from the first time that you met the customer until the latrines were completed?
 - What did you discuss in the first meeting?
 - How many other meeting did you have before construction started, what did you discuss in these meetings?
 - Did everything go smoothly during the discussion? Were there areas of disagreement?
 - How was the decision made on the type of latrine to be built?
 - Why did you decide to build the latrines the way that you did?
 - Do encounter problems with customers not accepting your advice? What do you do?
 - Is there an ongoing latrine that you can show us?
- How much did the latrine cost? (materials, labour cost – pit, floor, house)
 - Materials (pit, floor, wall, roofing)?

- Labour cost (pit/lining, floor, wall/roofing)?
- How did you arrive at this cost?
- How was payment agreed? (once or instalments)
- Is it possible that you can build similar latrines for two customers at different costs? Why?
- Did you make any modifications in order to bring down the cost of the latrines?
 - Design, materials, etc?
 - Who requested for the modifications?
 - * Was the modifications done to satisfy the customer or to ensure that you build cheaper latrines in order to get more customers?
- How did you reach the final agreement (oral or written)?
 - Can you tell us what was contained in this agreement?
 - Did you encounter any problems in reaching an agreement?
- How was the materials provided for?
 - All or some purchased by the customer?
 - Purchased all at once or in stages?
- How long did it take to complete the latrine?
 - Why did it take this long?
 - How many fundis worked on the latrines, why?
 - Is this the normal practice to work with other people, why?
- Did you encounter any problems during the building of the latrines?
 - *Construction stage:*
 - * *pit (any problems?)*
 - * *lining (any problems?)*
 - * *finishing/flooring (any problems?)*
 - * *superstructure (any problem?)*
 - * *acquiring materials (any problems – availability, suppliers, transportation?)*
 - Siting (space, neighbours)
 - Building permit from street government or other inconveniences
- When did you receive your final payment?
 - Was it as agreed or not?
 - Did you have any problems with the final payment?
- Tell us about your experiences in building latrines in unplanned settlement?
 - What unique skills have you gained from building latrine in unplanned settlements?
- Has any customer ever requested for a latrine that you cannot build? What did you do?
- Do you keep records of how many latrines you build, how much material is used, the cost and profit?
 - Can you tell us how you do this?
- How long have you been doing this work of building latrines?
 - Do you have other sources of income apart from building latrines?

- How does the income from building latrines compare with the income from other sources?
- How much do you make from building latrines in a year?
- How much do you make from your other jobs in a year?
- Can all fundi mason build latrines?
 - If no, what skills do you have that other fundi masons do not have?
 - Are there special skills required for building latrines in informal settlements?
 - What are they and why?

Enabling environment

- Is there any government sanitation laws that affect your work?
 - What does the law say?
 - How does it affect your work?
 - Who enforces the law?
 - If no sanitation laws are enforced, does it affect the number of latrines that you build and empty? How?
- Do you need to obtain permission from any government official before you start building or emptying a latrine?
 - Where do you get the permission?
 - How do you get the permission (pay)?
- Are there standard government guidelines and designs for latrines?
 - If yes, where do you get them and how much do they cost?
- Do you use government allocated sites for disposing of sludge?
 - If no, why?
- Did you have to register with any government department before you started working as a fundi mason and as latrine fundi?
 - If yes, what is the process? (fees)
 - Are you issued with a certificate indicating that you are a qualified latrine fundi?
- Have you worked with any government or NGO sanitation projects?
 - What project, where and when? Is the project finished or ongoing?
 - What was your involvement in the project?
 - What did you gain from the project?
 - Has the project had any impact on your latrine building skills? How?
- Have you attended any training on sanitation organised by the government or an NGO?
 - Which government department or NGO?
 - When, where, and for how long?
 - What did learn from the training?
 - Did you pay to attend or were you paid to attend?
 - Did you receive any form of support after the training?

- What support have you received or is receiving from the government or NGO?
 - Which government or NGO?

Section 4: Attitude and perceptions

Latrine options

- If you are to rank the latrines that you know in terms of being good, how would you rank them and why?
 - How would you rank the types of latrines that you build very often for your customers? Why?
 - Why do you think customers' demand the type of latrines that they do?
- What do you think needs to be improved on the latrines that customers prefer most?
 - Pit dimension, materials, etc.
- If training were to be organised for fundis on sanitation, what should it cover? And why?
 - How long should the training be for? And Why?
 - Who should organise the training? And Why?
 - What should be the fundis' contribution towards the training?

Emptying and disposal

- Do you think fundis should also offer customers emptying and disposal services? Why?
 - What improvement should be made on the way latrines are emptied? Why?
 - At what levels should latrines be emptied?
 - How should the emptying cost be calculated?
- How can the problems encountered with emptying latrines be resolved?
 - Who should do what? Who should support?
- How and where should sludge from latrines be disposed of? Why?
 - Should there be payments? Who should pay? How should the cost be calculated?

Demand and supply

- How many latrines do you think you can build in 6 months?
 - Why are you not building this number of latrines?
 - What can be done and by whom to ensure that you build this number?
 - Think about the last 3 latrines that you built, how did you get the job?
- How can customers be convinced to build better latrines?
 - Who should do what?
- How can you build better latrines for customers at cheaper cost?
 - What modifications need to be made? (pit dimensions, lining materials, slab, emptying procedures)?

- What should be done and by whom to increase the number of customers for latrines and emptying services? How can latrines be promoted to increase demand?
 - who should do what?
 - what system should be put in place to make it easier for customers to contact you?
 - How can customers know the types of latrines on offer and the cost estimates?
 - How can latrine
- How would you rank the whole process of dealing with the last three customers that you built latrines for? (*Good, fair, poor and very poor*)
 - why have you ranked it this way?
 - In what aspect of the process did you encounter most problems?
 - why do you think these problems occurred?
 - How can it be improved?
 - Who should do what?
 - How should final agreement be made with customers (oral or written + a witness) and why?
 - How should materials for latrines be provided to make the work smoother and faster?
 - How should the cost of latrines be calculated and circulated to potential customers to make it more transparent?
 - How should payment be arranged to make it suitable for customers and for you? (Instalments – how many)?
- How do you think fundis should work to make latrine construction and emptying faster?
 - Individually, in pairs or as a group? Why?
- What is your thought about fundis forming small groups for building latrines?
 - how should this group function,
 - who should support and in what areas?
- How can the problems encountered during latrine construction be resolved?
 - pit collapse, hard soil, high water table, expensive lining materials, poor slab, superstructure,
 - siting (space and neighbours), etc.
- Do you think that all fundis should be allowed to build latrines or just the trained fundis, why?
- Some customers say that fundis are the major problem, they are not trustworthy and they abandon one job and try to do many jobs at once, what do you think about these accusations?
 - Do you think that some fundis have some attitude that brings bad names to others?
 - What do you think fundis should do to improve their image with customers in order to get more customers?

Enabling Environment

- What type of law would you like to see established and enforced to encourage more houses to build, use and maintain latrines within a short time?
 - As fundi, what should be done to assist you to build ten times more latrines than you are currently building in a year?
 - How can the government and NGOs support you?
 - Should there be guidelines on basic design of latrines?
 - How frequent should a training be organised for fundis? (refresher courses)?
 - Where should the training be organised (technical colleges, by NGOs, Govt)?
 - Should fundis pay for training? Why?
 - What do you think about issuing certificates to fundis that are trained to build good latrines?
 - how would this help in raising the number of customers?
 - What do you expect the government to do in order to encourage many people to build good latrines soon?
 - What role should NGOs play?
 - What other things are stopping you from building more and better latrine in unplanned settlement?
 - Are there other factors beyond your control that has impact on the types, number and quality of latrines that you build?
 - If yes, what are they?
- Probe about:*
- *NGO programmes (training, tool support, mentoring and supervision)*
 - *Government programmes*
 - *Environment (e.g. soil conditions, space, etc.)*
- What do you think should be done to ensure that every house in Dar es Salaam build good latrines and maintain them in the next 5 years?

We have come to the end of the discussion; is there any thing you would like to mention or questions you would like to ask us?

Thank you for taking time to tell us about your work.

4. Questionnaire proforma for house owner survey

HOUSE OWNER QUESTIONNAIRE

Ref No:

Introduction

Good morning/afternoon/evening, my name is, We are conducting a research on the latrines and user practices in this area. Your answers will help us to understand the difficulties associated with building good latrines. This would help us to inform everyone including the communities, government and NGOs on what needs to be done to ensure that every house builds hygienic latrines in 5 years time. You do not need to give us your name, and your answers are confidential. We will use the information only to establish the problems with obtaining hygienic latrines in houses and suggestions for improving the situation. So feel free to give your answers.

Name of interviewer _____ Date _____

Street _____ Ward _____

Municipality _____ House No _____

a. Do you have a toilet in your house? Yes ☐ No ☐ (If no, terminate)

b. Do you have any information on the quantity of materials and cost of your latrine?
Yes ☐ No ☐ (If no, terminate)

SECTION A: KNOWLEDGE AND AWARENESS OF LATRINES AND EMPTYING SERVICES

Q1 What types of latrines do you know?

Basket latrine ☐ Tyre latrine ☐ Drum latrine ☐ Brick latrine ☐
Sanplat (sungura) ☐ Ecologia (ecosan) ☐ Pour flush ☐
Flash latrine (WC) ☐

Q2 How would you rank these latrines? (use nos. 1- 7; 1= excellent, and 7 =very bad)

Basket latrine ☐ Tyre latrine ☐ Drum latrine ☐ Brick latrine ☐
☐ Sanplat (sungura) ☐ Ecologia (ecosan) ☐ Pour flush ☐

Flash latrine (WC) ☐

Q2b Why have you ranked the latrines this way? (write brief comment for each)

Basket latrine _____

Tyre latrine _____

Brick latrine _____

Sanplat (sungura) _____

Ecologia (ecosan) _____

Pour flush _____

Flash latrine (WC) _____

Q3 Where did you see these latrines before you built yours?

Neighbours ☐ Visiting friends and relatives ☐

Saw them in institutions ☐ Places of Worship ☐ Places of Work ☐ Bar

☐

Others _____

Q4 What is the most common latrine in this area?

Basket latrine ☐ Tyre latrine ☐ Drum latrine ☐ Brick latrine

☐ Sanplat (sungura) ☐ Ecologia (ecosan) ☐ Pour flush ☐

Flash latrine (WC) ☐

Q5 Why do many people build these latrines?

SECTION B: PRACTICE (USAGE) - LATRINES

Q6 What type of toilet do you have?

Basket latrine ☐ Tyre latrine ☐ Drum latrine ☐ Brick latrine

☐ Sanplat (sungura) ☐ Ecologia (ecosan) ☐ Pour flush ☐

Flash latrine (WC) ☐

Q6b We have seen some latrines with steps (raised), is your latrine built like that?

Yes ☐ No ☐ (Go to No. 7)

Q6c Why did you raise your latrine?

Q7 When did you build your latrine?

< 1 year ☐ 1- 2 years ☐ 3 – 4 years ☐ 5 – 6 years ☐ >6years ☐

Q8 Who made the decision on the type of latrine built?

Owner ☐ Fundi ☐ Owner/fundi ☐

Others _____

Q9 Why did you decide to build this type of latrine?

Lower cost ☐ Can last for a long time ☐ Advice from friends/relatives ☐

It's the best latrine ☐ Space ☐

Other _____

Q10 Is your latrine also used as bath or separated?

Used as bath ☐ Separated ☐ (*Go to No. 13*)

Q11 Why did you decide to combine your latrine and bath?

Space ☐ Cost ☐ Because other people did it ☐

Fundi's recommendation ☐ Convenience ☐

Others _____

Q12 Where does water from the bath go?

Inside the latrine ☐ Pipe connected to drainage channels ☐

Outside into the street ☐ Shallow soak pit outside the bath ☐

Deep covered pit ☐ others - _____

Q13 Where is your latrine located?

Inside the house ☐ In the yard ☐ Outside the yard ☐

Other (specify) _____

Q14 Do all the people living in the house use the latrine? Yes ☐ No ☐

Q14b If no, how many are not using it _____

Q15 Do neighbours use this latrine? Yes ☐ No ☐

If yes, how many _____

Q16 Where did you get information about the type of latrine that you built?

Neighbours ☐ Visiting friends and relatives ☐ Saw them in institutions
☐ Places of Worship ☐ At places of Work ☐ Bar/hotel ☐
 Others _____

Q17 How did you find the fundi that built your latrine?

Neighbours ☐ Visiting friends/relatives ☐ Saw him building a latrine
☐
 Places of worship ☐ At places of Work ☐ Bar/hotel ☐
 Fundi is a family member/relative ☐ I am the fundi ☐ (go to No. 22)

Q18 How many meetings did you have with the fundi before he started construction?

Once ☐ 2 times ☐ 3 times ☐ > 3 times ☐

Q19 Did you disagree with the fundi at any time during negotiation and construction?

Yes ☐ No ☐ (Go to No.21)

Q20 What disagreement did you have?

Labour cost ☐ Payment method ☐ Quantity of materials ☐
 Supply of material ☐ Length of completion ☐
 Fundi abandoned work for another job ☐
 Others _____

Q21 How was the final agreement done with the fundi?

Oral (owner/fundi alone) ☐ Oral (owner/fundi/witness) ☐ Written contract
☐ Others _____

Q22 Some people we spoke earlier said that they build their latrines that they build their latrines in phases, waiting for sometime in between phases. How did you build your latrine?

<i>All at once</i>	<i>Phase 1</i>	Phase 2	Phase 3	Phase 4	Phase 5	Phase 6

Code:

1 = Pit/lining

2 = Foundation

3 = Cover

4 = Walls

5 = Door

6 = Roof

Q23 Why was there a gap between the phases?

Q24 Who provided the materials for construction?

Owner ☐ Fundi ☐ Owner/fundi ☐

Others

Q25 Fundi costs

(Please indicate the cost under the various categories)

All at once	Phase 1	Phase 2	Phase 3	Phase 4	Phase 5	Phase 6

Q26 Did you make any modifications on the original type during construction?

Yes ☐ No ☐ (Go to No. 29)

Q27 Why did you make the modifications?

Ran of materials ☐ Shortage of money ☐ To reduce cost ☐

Fundi's advice ☐ Advice from friends/relatives ☐

Suddenly had more money for better latrine ☐

Others

Q28 How long did it take to complete the latrine?

(Please indicate the length of time in the appropriate boxes)

All at once	Phase 1	Phase 2	Phase 3	Phase 4	Phase 5	Phase 6

Q29 How many fundis worked on your latrine at any given time?

All at once	Phase 1	Phase 2	Phase 3	Phase 4	Phase 5	Phase 6

Q30 What problems did you encounter during the construction of your latrine and how did you resolve it?

Problem	Solutions

Q31 What could have helped to make the process easier?

Q32 Was there any style that you wanted in the latrine that the fundi was not able to build?

None ☐ Yes ☐ (*Please describe*)

Q33 Why were the fundi not able to build what you wanted?

It will increase labour cost ☐

Fundi did not know how to built it ☐

Others

Q34 How many times have you emptied your latrine?

Once ☐

2 times ☐

>2 times ☐

Never ☐ (*Go to section C*)

Q35 Who emptied your latrine?

Myself/family member ☐

Fundi ☐

Small truck ☐

Big truck ☐

Q36 Where was the waste from the pit disposed of?

A pit near the latrine ☐

Fundi took it away ☐

Govt dumping site ☐

Drainage channel ☐

In the river ☐

Onto the road ☐

Don't know

☐

Others

Q37 How much did you pay to empty your latrine?

No cost ☐ < Tshs20,000 ☐ Tshs20,000 – Tshs39,000 ☐
Tshs40,000 - 59,000 ☐ Tsh60,000 - 69,000 ☐
Tshs70,000 – Tshs79,000 ☐ 80,000 & above ☐

Q38 What problems did you encounter with emptying your latrine?

None ☐ Lack of space for digging disposal pit ☐ High cost of emptying ☐
Difficulty getting fundi to empty latrine ☐
Others (specify) _____

Q39 What should be done to make emptying latrines easier?

SECTION C: KNOWLEDGE/PRACTICES/PERCEPTIONS RELATING TO THE ENABLING ENVIRONMENT

Q41 Are you aware of fundis who have been trained specifically to build latrines in this type of area? Yes ☐ No ☐ (*Go to No 44*)

Q42 What do you think are the advantages of trained fundis over the untrained ones?

Can provide pictures of available latrine choices ☐ Can build more types of latrines ☐
Build better quality latrines at lower costs ☐ Advice customers better ☐
Better information on costs ☐ None ☐
Others _____

Q43 What are the disadvantages of trained fundis over untrained fundis?

They are very few ☐ It is difficult to get them ☐ No special identification ☐
Can be more expensive ☐ None ☐
Others _____

Q44 What laws relating to latrine are you aware of?

Q45 Who enforces this latrine laws?

Health committees ☐ Street government ☐ Ward health officers ☐
Municipal health inspectors ☐
Others _____

Q46 How strongly are the laws enforced?

Very strongly ☐ Fairly strongly ☐ Not strongly ☐ Not at all ☐

Q47 What is the penalty for owners of houses without latrines?

Warnings ☐ Fines ☐ Taken to court ☐ Don't know ☐

Q48 What permission is needed before you start to build a latrine?

None ☐ Building permission from street government ☐ Don't know ☐

Q49 What laws do you think should be established for latrines?

Q50 Who should enforce these laws?

Health committees ☐ Street government ☐ Ward health officers ☐
Municipal health inspectors ☐ Others _____

Q51 What laws relating to emptying latrines are you aware of?

None ☐ All full latrines must be emptied ☐

Contents of the latrines should not be disposed into open places ☐

Others _____

Q52 Are you aware of any government or NGO sanitation project in this area?

Government ☐ NGO ☐ Both ☐ None ☐ (go to 54)

Don't know ☐ (go to 54)

Q53 What are they doing?

Activity	Government	NGO
Training fundi		
Subsidising latrines		
Giving free latrines		
Water and sanitation project		
Cholera control		
Others :		
Don't know		

Q54 What should be done to ensure that every house has a standard latrine in your area in the next 5 years?

Activity	Govt.	NGO	House owners

Section D: Basic demographic information

1. House information

(Fill in the appropriate number)

Family	No. of people in each family	Status 1(tenant (pay rent); 2= Owner 3 = Owner's relative (don't pay rent)
1		
2		
3		
4		
5		
6		
>7		

2. Information about house owner

(Tick the right response)

Sex: Female ☐ Male ☐

Age: < 20 ☐ 20 – 29 ☐ 30 – 39 ☐ 40 – 49 ☐ 50 – 59 ☐ 60 & above ☐

Education level:

Never attended formal education ☐ < standard 7 ☐ Primary education ☐
Form 4: (O level) ☐ Form 6: (A level) ☐ Diploma ☐ Above diploma ☐

Marital status: 1 (Single)☐ 2(married)☐ 3(divorced)☐
4(widowed)☐

Means of living:

1 (Government employee)☐ 2 (Private sector employee)☐
3 (Small scale business)☐ 4 (self employed)☐ 5 (Labourer)☐

6 (Others) _____

Family Income

(For government and private sector employees, ask for monthly income and divide by

4)

1 (< Tshs 3,000/week)☐ 2(< 5,000/week)☐ 3 (5,000 – 10,000/week)☐
4(<15,000)☐ 5 (>15,000/week)☐

5. Extracts from focus group discussions transcripts

5.1 Knowledge and awareness of latrine options amongst SIPS

Box 1 : Field insight – knowledge of traditional pit latrine

UNTRAINED SANITATION PROVIDERS

Case 1
Municipality: Ilala
Ward: Kombo
Case description: Untrained sanitation providers

Quotations:

P10: FUNDIS (2).txt - 10:26 (283:285) (Super) Codes: [knowlat] [Traditional pit]

Fundi 1: Mmh, I know because of the environment, for example the drum latrine depends on the area, in a place that I live you do not need to use a drum, just make a pit of 12 feet then you put tree stems and cover it with soil, and the latrine is ready for use.

TRAINED SANITATION PROVIDERS

Case 2
Municipality: Temeke
Ward: Keko Mwanga B
Case description: Trained sanitation providers

Quotations:

P 5: Keko Mwanga Fundi.txt - 5:10 (117:117) (Super) Codes: [knowlat] [Traditional pit]

Fundi 1: I know of a latrine that you just dig a pit, place logs on top and make a superstructure.

Box 2: Field insight – knowledge of basket latrine

TRAINED SANITATION PROVIDERS

Case 1
Municipality: Temeke
Ward: Keko Mwanga B
Case description: Trained sanitation providers

Quotations:

P 5: Keko Mwanga Fundi.txt - 5:62 (614:619) (Super) Codes: [basket latrine]

Fundi 1: There are two types of latrines which have not been mentioned. When I came in Dar es Salaam for the first time in 1999 there was no cement, people were using 'matenga' (basket). There are certain trees found in the coastal areas called 'mikoko'- mangrove which are used to make something like a basket, they dig a hole and dig in the 'tenga', and then they cover it with logs and finish with mud platform.

Case 2
Municipality: Ilala
Ward: Buguruni/Vinvinguti/Mbagala
Case description: Trained sanitation providers

Quotations:

P 7: trained not supported(1).txt - 7:31 (259:263) (Super) Codes: [basket latrine]

Fundi 8: The owner has to contact a person who can make the (tenga) weave of twigs. The woven tree twigs will be prepared according to the specified depth of the pit. People in sandy areas, as said before do this, as they cannot afford to line a pit with blocks. A pit would be dug and the woven twigs will be fitted in, the pit is usually 6ft deep. Tree logs are arranged at the top, about 8 logs are used. A drop hole is provided and a bag of cement is used in making the latrine floor. The shelter of the latrine is made of either nylon sheets or palm fronds.

Key points:

- Basket latrines are rarely built these days and have since been replaced by other lining methods.
- Basket latrines used to be the entry point on the sanitation ladder especially for poor households.
- Many of the small independent providers were not aware of the basket latrine, as demonstrated from the two quotations, which came from only 2 groups that have attended some form of organised training.

Box 3: Field insight – knowledge of tyre latrine

UNTRAINED SANITATION PROVIDERS

Case 2
Municipality: Temeke
Ward: Keko Mwanga A
Case description: Untrained sanitation providers

Quotations:

P10: FUNDIS NO. 7 VETA (2).txt - 10:16 (199:201) (Super) Codes: [knowlat] [tyre latrine]

Fundi 1: There are other people for example in the lowlands who put the tyres up to a certain depth they think it is enough to be called a latrine, when it rains the waste products are drained outside in the open.

TRAINED SANITATION PROVIDERS

Case 3

Municipality: Ilala
Ward: Buguruni/Vinvinguti/Mbagala
Case description: Trained sanitation providers

Quotations:

P 7: trained not supported(1).txt - 7:28 (240:246) (Super); Codes: [knowlat] [tyre latrine]

Fundi 11: There are tyre latrines. You dig a pit and drop car tyres one on top of the other. At the top, logs are arranged and concrete poured and the latrine is ready. The problem is that wastewater from the pit oozes out between the tyres polluting the ground and thereby endangering the life of people. The latrine is dangerous but people build it because of poor economic condition.

Case 4
Municipality: Temeke
Ward: Keko Mwanga B
Case description: Trained sanitation providers

Quotations:

P 5: Keko Mwanga Fundi.txt - 5:63 (622:624) (Super); Codes: [tyre latrine]

Fundi 3: The car tyre has a ring, and there is a hole in the middle. They dig a hole in accordance to the size of the tyre and arrange the tyres up to the top of the pit. The depth of the hole depends on the wishes of the household.

Box 4: Field insight – knowledge of drum latrine

UNTRAINED SANITATION PROVIDERS

Case 1
Municipality: Ilala
Ward: Kombo
Case description: Untrained sanitation providers

Quotations:

P 1: Kombo fundis.txt - 1:26 (165:167) (Super) Codes: [drum latrine]

Fundi 1: I use 2 or 3 drums. The pit depth is 7ft, and the width is 4-5 ft. At the top, I use half a bag of cement.

Fundi 2: There are some which are local: You dig a pit and fit in drums and cut a hole at the top- they are called drum latrines.

Case 2
Municipality: Temeke

Ward: Mamboleo B
Case description: Untrained sanitation providers

Quotations:

P 2: Maboleo b untrained.txt - 2:14 (135:140) (Super) Codes: [drum latrine] [knowlat]

Fundi-10: Apart from the latrine that has been described, what I know is the Drum latrine. The owner is required to have 2 or 3 drums, or even one. You dig a pit in relation the size of a drum (diameter), which would have its base cap removed so that it can allow water to flow in the ground. This type of latrine is widely used in rural areas and in urban areas where space is not available, so a person with little space can build a drum latrine, instead of lining with blocks, the drum takes the position of a block lining.

TRAINED SANITATION PROVIDERS

Case 4
Municipality: Ilala
Ward: Buguruni/Vinvinguti/Mbagala
Case description: Trained sanitation providers

Quotations:

P 7: trainednot supported(1).txt - 7:20 (207:209) (Super) Codes: [drum latrine]

Fundi 8: The difference between a simple and a drum pit latrine is from an environmental point of view. The unlined pit latrines are not good for the environment they are environmentally poor. You can, for example, take a drum remove the caps on both sides and fit it into a pit you have dug, and cover. These latrines are more environmentally unacceptable.

Fundi 9: Drum latrines; people dig a pit and fit in a drum and arrange wood logs to support weight. The problem is that the drum rusts without the knowledge of the user, that one day it will collapse endangering the life of people.

Case 5
Municipality: Temeke
Ward: Keko Magurumbasi (ZamCargo)
Case description: Trained sanitation providers

Quotations:

P 8: fundi's keko Veta(1).txt - 8:16 (260:265) (Super) Codes: [drum latrine]

Fundi 1: For a bin latrine, you just dig a deep pit, the one that you are sure will be enough for one bin or two because they are touching each other, the top and bottom one. You just fill in soil not cement or stones probably just ordinary stones to stabilize the bin so that it is not wobbly. In the first place the soil should settle well and you will need to elevate the place as you put the stones. Pour the soil then cement over it such that if a person who is not a fundi looks at it he wouldn't know what is below.

Fundi 2: I mean you make a pit and put logs called 'Mirunda' at the top, then you put concrete, you build a hut and if you can you roof using iron sheets, if you cannot you just leave it open. There are also drum latrines some people do take drums and cut their covers and dig them in and make a hole which is for defecation and then they build a small hut and put an entrance and cover it with iron sheets then you can get in and continue with your activities.

Key points:

- Drum latrine is perceived to be a more acceptable first step in the sanitation ladder, as it is more stable and lasts longer than all the other temporary latrines.
- In reality, drum latrines are the third step in the sanitation ladder after the basket and the tyre latrine. It is perceived as the cheaper alternative to lining with brick or cement block.
- Similar to the tyre, drums used in lining latrines are rarely excavated when abandoned and people simply shift to another site further compounding the problem of space for latrines in low-income urban settlements.

Box 5: Field insight – Knowledge of brick latrine

UNTRAINED SANITATION PROVIDERS

Case 1
Municipality: Temeke
Ward: Mamboleo B
Case description: Untrained sanitation providers

Quotations:

P 2: Maboleo b untrained.txt - 2:12 (113:119) (Super) Codes: [knowlat] [Pit latrine]

Fundi-7: The Uswahilini latrine is just a pit, waste and water go directly into the pit. There is no separate pit for collecting waste water like the ones you have in the offices, which has two tanks, septic tank and soak pit. One of the tanks retains the waste and the other receives the waste water. And when the car comes it sucks out the wastewater from the soak pit, the tank with the waste is left for people to empty the waste. For people like us 'walala hoi' (people of low income), who live in areas where houses are compact we cannot find space to be able to dig two pits, and the cost is very high.

Fundi 8: You have the common latrine where all the waste goes and when it fills up, a pit will be dug besides the latrine the contents of the full latrine will be emptied in the freshly dug pit. Alternatively, you may bring a truck to empty the pit.

TRAINED SANITATION PROVIDERS

Case 3

Municipality: Ilala
Ward: Buguruni/Vinvinguti/Mbagala
Case description: Trained sanitation providers

Quotations:

P 7: trainednot supported(1).txt - 7:26 (231:233) (Super) Codes: [Pit latrine]

Fundi 1: The common pit latrines, the pit can be square or round. They apply 'plaster' on the wall of the pit and a hole is provided to allow water from the pit to seep out. There is no ventilation pipe.

Fundi 2: Raised pit latrines These latrines are built in areas with high water table. So instead of digging deeper, people raise the pit with blocks and the pit would be plastered and covered. When one is accessing the latrine he/she has to go through a number of stairs. The facility is also used as a bathroom, but bath water is discharged into the open. The height of the latrine goes up as high as 8 to 9 ft.

Box 6: Field insight – Knowledge of sanplat (sungura) latrine

TRAINED SANITATION PROVIDERS

Case 1
Municipality: Temeke
Ward: Keko Magurumbasi (ZamCargo)
Case description: Trained sanitation providers

Quotations:

P 8: fundi's keko Veta(1).txt - 8:40 (552:558) (Super) Codes: [knowlat] [sanplat]

Fundi 1: I would probably say the ordinary latrines but that's not the end, there are others like we have learnt. I have been a fundi for a month but I have learnt a lot today. My head is full of ideas like lining pits with bricks whereby you can just lay them without using cement, and then you use a sungura. I have also seen the plastic that looks like a sink. This means that I have learnt about other latrines. I don't think there would be other types that are new because if you had told me that there are other different types here in Tanzania it would have been a wonder but I have learnt otherwise from the seminars and advise on how to make other latrines.

Fundi 3: We do not know why it is called sungura but probably it resembles a hare's head.

Key points:

- This option was introduced by NGOs and only those latrine builders that have attended training are aware of this option.
- It is important to note that no group of untrained sanitation providers were aware of this

latrine option.

- It is an improved form of brick latrine where a slab made of cement mortar can be used in place of squatting ceramic or plastic pans and it does not require water for flushing.

Box 7: Field insight – knowledge of ecosan latrine

Case 2
Municipality: Tememe
Ward: Keko Magurumbasi (ZamCargo)
Case description: Trained sanitation providers

Quotations:

P 8: fundi's keko Veta(1).txt - 8:26 (399:407) (Super) Codes: [ecosan]

Fundi 1: First of all you dig and lay the foundation with cement blocks, then you pour a weak concrete mix up to about 1ft you cover it. The next step is to build a two compartment square structure of 3.5ft x 5ft with cement blocks. You then plaster it and place the squatting slab with 2 holes on top, one hole for urine because the ecosan latrines separate the urine from the other waste. Water and urine go one way while the other waste goes another way. You then put up doors at the back of the compartments. This enables you to open one door when you want to empty the pit. People like it very much because it empties into the garden and it is profitable. It has many advantages like building it anywhere; conserving the environment and it is clean such that it doesn't attract flies unlike in the past where the tanks would be working today and then spoilt the following day.

Case 3
Municipality: Tememe
Ward: Keko Mwanga B
Case description: Trained sanitation providers

Quotations:

P10: FUNDIS NO. 7 VETA (2).txt – 10:138 (1883:1888) (Super) Codes: [ecosan]

Fundi 1: The way it has been built, let us say they have made a foundation like for a house. Because of the high water table, you have to raise the foundation and build upwards to make a square chamber with four angles. This is then divided in the middle to create two chambers. The top is then covered with reinforced concrete squat slab with two drop holes. The superstructure is then built around the completed structure.

Key points:

- Many of the latrine builders have never seen nor built one except for those who have been trained by the NGOs.
- No group of untrained sanitation providers mentioned this latrine option.

- There seem to be mixed feelings about it especially with handling human faeces during emptying. Moreover, the the majority of the areas are high density settlement and do not have any space for kitchen gardens. Therefore, it will not be possible for the manure and urine from the ecosan latrines to be used in farms.
- It is not known how the few households with this latrine will handle it when they fill up, as they are still very new.

Box 8: Field insight – Knowledge of pour-flush latrine

UNTRAINED SANITATION PROVIDERS

Case 1
Municipality: Kinondoni
Ward: Manzese/Tandale
Case description: Untrained sanitation providers

Quotations:

P 9: fundi manzese and tandale(1).txt - 9:10 (204:205) Codes: [flush latrine] [pour-flush]

Fundi 1: A flush latrine. There is also another type that you put a sink on the side, you build a structure on the side and then you bend a pipe which goes into the pit so you put water instead of flushing.

TRAINED SANITATION PROVIDERS

Case 3
Municipality: Ilala
Ward: Buguruni/Virvinguti/Mbagala
Case description: Trained sanitation providers

Quotations:

P 7: trainednot supported(1).txt - 7:16 (153:158) (Super); Codes: [Pit latrine] [pour-flush]

Fundi 6: Yes: - We build these common round pits latrines. Latrines which have pits separated from the shelter, they are called pour-flush - The common round pits latrines but raised. Fundis go to the site with a plan already in the mind; in addition to that fundis help one another on technical know-how. Because some have been to college and some have been trained by organizations like Plan.

Key points:

- Pour-flush latrines are seen as the technology for the 'rich' people in the study areas and often found in houses of local politicians or business men.
- Although it is not much more expensive than the 'brick' latrine, it is considered so due to the

requirement to use water.

- The majority of the latrine builders are aware of this technology. There were not too many discussions about it, as it is considered a luxury for the majority of the residents of the low-income settlements.
- According to SIPS, some house owners that cannot afford the real pour-flush ask them to install a ceramic squat pan on their brick latrine except that it will not have a water seal.

Box 9: Field insight - Knowledge of water closet (flush latrine)

UNTRAINED SANITATION PROVIDERS

Case 1
Municipality: Temeke
Ward: Mamboleo B
Case description: Untrained sanitation providers

Quotations:

P 2: Maboleo b untrained.txt - 2:12 (113:119) (Super) Codes: [flush latrine] [knowlat]

Fundi-7: You have latrines in the offices that have two tanks, septic tank and soak pit. One of the tanks retains the waste and the other receives the waste water. When it is full a truck comes and sucks out the wastewater from the soak pit, the tank with the waste is then manually emptied. For people like us (walala hoi- people of low income), who live in areas where houses are compact, we cannot get space to be able to dig two pits, and the cost is very high.

Fundi-12: We build a latrine at a point and connect it with the city drainage system, so you don't dig a pit. In areas around the city where there is a drainage system of the city council, you build and ask for a permit from the authority to connect your latrine with the drainage system. The waste from your latrine will be washed directly into the drainage system. The areas include Kijitonyama, there is a drainage system there, in Kariako where we are building, there is a drainage system, and many parts in fact are covered by the drainage system.

Case 9
Municipality: Mixed
Ward: Mixed
Case description: Untrained sanitation providers (**Frogmen**)

Quotations:

P 6: Frogmen - FGD.txt - 6:4 (25:30) (Super) Codes: [flush latrine] [knowlat]

Frogman 1: Other latrines are the flush type; you find them where people with high income live. Some people degrade the work and despise us but there are others who praise us of the work. Some after having their latrines furnished with tiles, they do not consider us that we could do the

emptying but that by so doing we can destroy the facility so they send for vacuum trucks instead. But trucks do not empty the pit of the whole excreta matter; the car sucks out the liquid part of the waste leaving the solid matter intact.

5.2 SIPS' perceived performance of latrine options

Box 10: Field insight – SIPS perception of house owners' latrine preferences

UNTRAINED SANITATION PROVIDERS

Case 1
Municipality: Ilala
Ward: Kombo
Case description: Untrained sanitation providers

Quotations:

P 1: Dummy fundis.txt - 1:5 (45:53) (Super) Codes: [latrank]

Fundi 1: I would do it like this, 1. Flush latrine 2. Direct pit latrine 3. Drum latrine 4. Basket latrine. I rank them like this because of their quality, but you should also bear in mind the cost of each latrine.

Case 2
Municipality: Temeke
Ward: Mamboleo B
Case description: Untrained sanitation providers

Quotations:

P 2: Maboleo b untrained.txt - 2:39 (378:380) (Super) Codes: [latrank] [roundpitrank]

Fundi-5: The latrine whose pit is round and lined with blocks laid flat is the best. The cover could be of wire mesh and concrete or logs on top of which concrete is poured. This would be no.1 if ranked. The issue remains the same; we look at space and the level of use. It is the use of the facility, which contributes to the short time by which the latrine fills up. I emptied a pit for a customer; the thing that came out made the customer chase all the tenants, charcoal stoves, shoes for the local militia, cooking utensils, for what reason were they thrown in to the pit? That is why other people use basins. Now this person after chasing away the tenants is using the facility with his family alone. A pit latrine is short lived by a number of things, pieces of cloth, plastic bags that do not decompose, and the water from the bathroom. So you find that the waste materials, which do not decompose, float, therefore if you had thought that the latrine would last for 10 years, instead it would be used for 5 years only.

Fundi-8: There is a pit latrine (round-pit –lined to the top). Depending on the capacity of the owner, others would have some sort of a box at the centre underneath the logs, and concrete would then be poured. The box shaped cast is to prevent sagging of the pit cover. Others buy wire mesh and gravel to cover the top. For me this would rank no.1. Drum pit latrine, tyre latrine, direct pit latrine (lined with blocks laid either flat or upright for circular and rectangular pits). If you want a long lasting latrine, you have to lay the blocks flat and they have to be in pieces, when lining your round pit, but in Uswahilini, people ignore other expenses as unnecessary but they are very important. If

you 'plaster' the inside of the lining wall, it means you have added strength to it because no insects can harm the wall. Some last 10 and others 50 years. Therefore a lasting latrine is the one whose pit is lined with blocks laid flat.

Fundi-1: As a fundi, after looking at the environment of the house, I will assess if there is enough space to build a self contained latrine, (one built inside the house and the tanks are outside). But with poor space, I would recommend the common, round 'brick' latrine.

Fundi-12: If we decide to rank latrines, in terms of durability, it would be like this: those connected to the drainage system of the town; the latrine with two tanks; the uswahilini latrine with a concrete cover but the waste is washed into the pits built far from the shelter (pour-flush) and drum latrines.

Fundi 1: I agree with the last speaker on how he has ranked the latrines because with the system of the town, it is appropriate to put the latrines that drain to the city drainage system and finally into the sea. No. 2 should be the latrine with two tanks and thirdly our latrines in Uswahilini with the shelter on top of the pit. Fourthly, should be the drum and to occupy the fifth position are the tyre latrines, and lastly, that a person is poor with nothing then we should put the iron sheet latrine.

Fundi-6: The durable long lasting latrine for me is the one lined with rocks. Because here in Dar, we have latrines which are 30-60 years old. Also the latrine with a rectangular pit with blocks laid flat, 12ft depth and a substantial width you can use for as many as 20 years. I have got mine which is 16 years old, only one pit which is 6x8ft internal dimensions after lining and 12ft depth. A person can use rocks, because when you line a pit with rocks, you are assured of a 'steel' (strong) latrine, so a wealthy person would tell you to line the pit with rocks from the base to the top and the rocks should be round, for a pit 10ft diameter and 12ft depth. I made a partition for two latrines, I have 6 tenants, my children occupy two rooms, and the facility is still serving. But I didn't use the facility as a bathroom, that's is, the after bath wastewater doesn't flow into the pit and I frequently pour kerosene, after every 3 months I pour kerosene into the pit and the waste goes down, it solidifies and the latrine does not smell.

Case 3
Municipality: Kinondoni - MwaNyamala
Ward: Kwa Kupa
Case description: Untrained sanitation providers

Quotations:

P 3: paired fundi interview.txt - 3:1 (14:23) (Super) Codes: [latrank] [Pit latrine]

Fundi 1: They are pit latrines. The first type, you can build a latrine (by lining the pit with blocks) in circular or in rectangular shape, depending on how the pit was dug. You can line a square/ rectangular pit with blocks laid in an upright position in the pit, but not broken into 2. You can line a circular pit with blocks laid flat and broken into two. You can line the square pit with the blocks laid flat but the blocks are not broken into two. You can line the circular pit with blocks laid in the upright position but one block is broken into two. Of all the 4 ways of lining the pit, the most durable is the

one lined with blocks broken into two and laid flat.

Fundi 2: If we would rank in terms of quality, I would say the latrine with a circular pit, lined with blocks broken into two and laid flat is the most durable. The second would be the one with blocks lined laid flat but not broken, then the third would be the circular pit lined with broken pieces of blocks laid in the upright position, the last would be the rectangular pit and lining blocks laid in the upright position. For a good latrine, still the latrine with broken blocks and laid flat in a circular pit is the best.

Case 4
Municipality: Temeke
Ward: Keko Mwanga A
Case description: Untrained sanitation providers

Quotations:

P10: FUNDIS NO. 7 VETA (2).txt - 10:22 (256:257) (Super) Codes: [latrank]

Fundi 3: Eeeh, maybe the difference here should be in quality because the quality of pit or tyre latrine is different from that of flushing latrines, every latrine has its own quality.

Fundi 1: Pit latrines can last fifteen to twenty years because they are dug 12 feet but for the drum latrines you cannot dig up to 12 feet. The tyre latrines cannot go 12 feet deep because when you dig 12 feet deep for the pit latrine, width is 8 feet but for the drum latrine you cannot take width to be 8 feet if you want it to stay longer.

Fundi 4: I can contribute; the existing difference with the flushing latrines is that most of them are permanent. When they are full, you can call a lorry to desludge but for pit latrines, when they are full, there is no way and nothing you can do other than covering it up and making another latrine which is another cost. And for the tyre latrines, when they are full you follow the same process like that of a pit latrine. Do you see it is different and the difference of the rest has already been said by Mr in here, when it is full, it is opened and emptied.

TRAINED SANITATION PROVIDERS

Case 5
Municipality: Ilala
Ward: Buguruni/Vinvinguti/Mbagala
Case description: Trained sanitation providers

Quotations:

P 7: trainednot supported(1).txt - 7:32 (267:267) (Super) Codes: [latrank]

Fundi 8: For durability or being good latrines, the drum and tree pit latrines have neither. The best latrine is the pit latrine lined with blocks, the one that Plan used to build (VIP). It uses 6" blocks for durability.

Fundi 2: If Tanzanians were able to build good latrines, I would advise them to build rock latrines. Because rocks have a nature of growing as compared to blocks which erode and weaken with time, and blocks attract fungus, which is destructive. Therefore with rock lined pits, people will be assured of durable latrines, they will be replacing logs only, because there are rock latrines which were built many years ago but are still in use. Blocks last for between 20-30 and rocks over 30 years. For those with the capacity, they should build rock latrines, because durability of a latrine depends on the capacity of the owner.

Fundi 11: The best latrine is the ecosan latrine. It is good because it can be built where houses are congested, there is no need to dig a pit, excreta is separated from urine, the urine can be used as manure. Because the latrine has got two chambers when one fills up, the other will be closed for the excreta to dry up. Later the dried excreta can be applied on the field as manure. It is affordable even to people of low income.

Fundi 10: I will have two types of latrines as the best types: i) The flush latrine, but the pit should be lined with rocks. The shelter can be built and the sink installed at one point and the two pits, the one for mixing should be lined with blocks, but the biggest pit should be built of rocks, it will be more durable.

ii) I agree with my colleague that ecosan latrine (ekolojia) is a good latrine, that it should be ranked second because it is environmentally safe; it has no smell, once inside you do not feel awful. And during changing of the chambers, that is, during desludging, it is done at the time when the excreta is dry and free of any germs, so you are not in any danger. It is a long lasting latrine and people with poor income can afford having it. No more digging of pits.

iii) People in these areas do not prefer this type of latrines, they prefer pit latrines, and they are used to it. But I would like to see ecosan latrines built in dry areas because they are advantageous in that the environment remains clean (unpolluted) they do not smell. And when one pit fills up it is closed and the excreta dries up, after all it is not mixed with urine. Therefore in a month's time the excreta would have turned into dry substance which you can handle and get no infection, as there would be no living organisms. So you have manure.

The drum latrines are in use but the problem is that the drums rust without the knowledge of the user, and when it rains the latrine collapses with the waste flowing into water sources to cause eruption of communicable diseases.

Fundi 12: The flush latrine is the best because a number of people can organize themselves so that there is one big main pipe and every one should have a flush latrine with their pipes connected to the main pipe for discharge. So the main pipe will be collecting all excreta from that number of latrines and taking it to either a big pit or treatment place for the benefit of all and not just individuals. This is suitable in areas with high water table. Another type of good latrines is the pit latrine with a lined pit. But users should put ventilation pipes 1-2ft above the roof, so that foul smell is taken away. In addition to that drop holes should have covers; users should make some so that

the inside of the latrine is airy because air circulation helps in drying the excreta in the pit. Water can get out through the vent pipe as vapour. This is suitable for people living in dry areas.

Fundi 8: Ecosan latrines are not suitable for families with big number of people, for example 6. They are suitable for a man and his wife and their two or three children. They are used on time limit, i.e. changing chambers, this calls for people who have crop fields, therefore they are suitable in rural areas and not in urban areas. In rural areas there is enough land to dig and dispose of the desludged matter or apply it on one's field. They are good, they do not smell, but in urban areas people do not have ample space to accommodate the 2 chambers, and it complicate matters when one is desludging, because of how other people are going to look at you. The drum latrines rust fast, they smell and because the pit is not lined, when it rains it will easily cave in and the latrine will collapse, waste and flies would come out to pollute the environment.

Fundi 7: Most people do not like the ecosan latrines because of their fear on cholera. Cholera erupts frequently in many parts of Dar es Salaam. Having no areas to dispose of the waste, people with ecosan latrines can dispose of the excreta haphazardly, and excreta is excreta even if it is dry. Once it gets in contact with water to make it wet it will regain its original state and therefore would be capable of carrying infectious agents.

Case 6
Municipality: Temeke
Ward: Keko Mwaga B
Case description: Trained sanitation providers

Quotations:

P 5: Keko Mwaga Fundi.txt - 5:16 (135:137) (Super) Codes: [lat durability] [latemptdiff]

Fundi 1: These modern latrines can be used for much longer time, over 10 years while the pit-latrines cannot be used that long, and emptying is difficult as there no roads for the desludging trucks to pass through.

Case 7
Municipality: Temeke
Ward: Keko Magurumbasi (ZamCargo)
Case description: Trained sanitation providers

Quotations:

P 8: fundi's keko Veta(1).txt - 8:2 (148:148) (Super) Codes: [ecosan] [knowlat] [skeplat]

Fundi 3: It is an ecosan. The Cargo area is so congested such that it reached a point where it was hard to dig up one but fortunately now there are the ecosan latrines that you can put up anywhere there is space and many people like it.

5.3 SIPS' perceptions of house owners' latrine preferences

Box 11: Case history - SIPS perceptions of household preferences and aspiration

UNTRAINED SANITATION PROVIDERS

Case 1
Municipality: Temeke
Ward: Mtoni/Kombo
Case description: Untrained sanitation providers

Quotation:

P 1: Dummy fundis.txt - 1:10 (66:69) (Super) Codes: [Hhlatpref]

Qn; Of the 4 latrines mentioned, which ones do the people demand the most?

Fundi 1; It depends on the category of the people in need of the latrine, that is, the poor who can only afford basket latrines, and the middle income who prefer direct pit latrines, and the rich who prefer flush latrines. The the majority of the people in Mtoni have direct pit latrines, about $\frac{3}{4}$ of them, then few people have drum latrines $\frac{1}{4}$ and significantly very few have the flush latrine. More people opt for the direct latrine, (though it is difficult to empty) because of the water scarcity in Mtoni. The squat pit latrine is preferred by most because of the fear of diseases such as stomach ache, dysentery, cholera etc if they sit on a shared latrine.

Case 2
Municipality: Temeke
Ward: Mablolo B
Case description: Untrained sanitation providers

Quotations:

P 2: Mableleo b untrained.txt - 2:20 (205:208) (Super) Codes: [Hhlatpref]

Fundi 1: For a 'well off' individual who also has space, you can dig a pit, pour concrete on the ground base, start lining by laying the blocks flat to the top and he can tell you to do the plastering of the pit after do the finishing with 'nilu' (plinth) so that when the pit fills up he will be able to hire a truck for emptying.

Fundi 10: The one that is built the most is the round latrine with the pit lined with blocks cut into pieces and laid flat; the rectangular pit is rarely built.

Fundi 9: The last time I built a latrine was in August last year. I built my customer a pit latrine with the pit round, lined with pieces of blocks laid flat. Most latrines in Uswahilini are built in this way.

Fundi 5: This depends on the capacity of the house owner, if he can afford and if not, then you go for the drum or tyre latrine. People fall into 3 categories; the economically poor (poor capacity); the economically good (have capacity); the economically well off (have extra capacity). Starting with the third category, this person cannot lack big space, so he will prefer a latrine with two tanks,

the second category, the commoners, they can afford the round latrine and there is the poor, who just think of nothing else but a place to relieve themselves so they go for the drum or tyre latrine. Many people want a latrine that will last long and they even ask often, "can I use it for 10 years?"

Case 3
Municipality: Mixed
Ward: Mixed
Case description: Untrained sanitation providers (pit emptiers)

Quotations:

P 3: paired fundi interview.txt - 3:11 (91:94) (Super) Codes: [Hhlatpref]

Fundi 1: Because most of the population in Mamboleo are low income earners and there is no way you will get a flush latrine in your house when you don't have enough money to sustain it, because you cannot spend water that is valuable to flush latrine waste. So people here prefer pit latrines where you need no water to use the facility.

Case 4
Municipality: Ilala
Ward: Mtakuja
Case description: Untrained sanitation providers

Quotations:

P 4: fundis vingunguti.txt - 4:9 (226:226) (Super) Codes: [Hhlatpref]

Fundi 1: A big percentage of the latrines where I work are pit latrines.

Fundi 1: In general the pit latrines, you dig cover it and use bricks on top.

Fundi 1: Most clients trust the round one. It is very stable, that's why most clients prefer it.

Case 5
Municipality: Mixed
Ward: Mixed
Case description: Untrained sanitation providers (pit emptiers)

Quotations:

P 6: Frogmen - FGD.txt - 6:2 (11:15) (Super) Codes: [Hhlatpref] [knowlat] [latempty]

Frogman 1: Pit latrines with the pit lined with blocks; this type of latrines is the most preferred by us people of low income. Emptying is mostly done in this type of latrines. In some cases we break the cover and make a hole, empty the whole waste and transfer it into another pit that is dug beside the latrine.

Frogman 2: The type of latrines built depends on the economic condition of people. A low income earner would opt for a drum latrine of two drums only, which are not enough, but a person with high income builds a lasting latrine, one that would serve him for 3- 4 years or even more.

Frogman 3: For us in Mwananyamala, we work on pit latrines with the pit lined with blocks, mostly,

because very few people in Mwananyamala use drum latrines. The reason behind this is that the area has a high water table, so it is watery, that, a drum latrine cannot serve for more than 2 or 3 months before it crumbles as drums rust fast.

Frogman 4: It is the same everywhere; if you find a person with a drum latrine, then you should know that the condition is not good, therefore the facility is a temporary one and that the person is preparing for a lasting latrine.

Case 6
Municipality: Temeke
Ward: Keko Mwanga A
Case description: Untrained sanitation providers

Quotations:

P10: FUNDIS NO. 7 VETA (2).txt - 10:83 (929:933) (Super) Codes: [Hhlatpref]

Fundi 1: I stick to the same point, cash is what matters because he makes his decision in relation to his ability so when you decide for him that Mr, this area is good for this type of latrine, he will think of the material cost. Can I manage? He would then say Ah ah, I only need a normal latrine, and you just build here and cover it.

TRAINED SANITATION PROVIDERS

Case 7
Municipality: Temeke
Ward: Keko Mwanga B
Case description: Trained sanitation providers

Quotations:

P 5: Keko Mwanga Fundi.txt - 5:59 (506:513) (Super) Codes: [Hhlatpref]

Fundi 1: The people in Keko prefer mostly the pit and chamber latrines. A pit latrine is built together with its wall and roof that is, in the pit, walls and roof are in the same place but the chamber latrines are different, as you dig a pit a bit far from the place where the latrine is located.

Case 8
Municipality: Ilala
Ward: Buguruni/Vinvinguti/Mbagala
Case description: Trained sanitation providers

Quotations:

P 7: trainednot supported(1).txt - 7:18 (194:199) (Super) Codes: [Hhlatpref] [skeplat]

Fundi 7: Most people do not like ecosan latrines because of their fear of cholera. Cholera erupts frequently in many parts of Dar es Salaam. Having no areas to dispose of the waste, people with ecosan latrines can dispose of the excreta haphazardly, and excreta is excreta even if it is dry. Once it gets in contact with water to make it wet it will regain its original state and therefore would

be capable of carrying infectious agents.

Fundi 1: It depends on areas. Where I live people prefer pit latrines, not flush type because that needs a lot of water and people cannot afford that.

Fundi 2: My customers prefer two types of latrines: i) Pit latrines, because of economic condition ii) Flush latrines $\frac{3}{4}$ of my customers prefer pit latrines with lined pits because of their economic condition, and when a PVC pipe is fixed for ventilation then the customer is assured of a good latrine. There are few whom I have built flush latrines for. And many people after seeing the durability of pit latrines built by Plan International, they have been building latrines according to Plan's design. They prepare building materials and ask you how you went about building Plan's latrines. So you tell them and you build their latrines based on Plan's latrine design (VIP). We make a provision (a step off the floor) for a bath place. That is the bath place is lowered leaving the floor with the drop hole a little higher so that, after one has taken bath, the waste water does not flow into the pit but goes out through an opening into a pit outside the latrine, people like these latrines because of this. I have built these latrines in Tabata, Kitunda, and Majabe. With Plan International I built 36 latrines in Vingunguti area. Outside the project I have built for customers a lot of latrines, about 25-30. There are more than 10 latrines still under construction.

Fundi 4: I built latrines of two types for my customers: i) Pit latrines with a block lining; this is related to economic condition of customers ii) There are people with enough space to allow for flush latrines. For people who can afford the cost of these latrines I build them the latrines. There are some flush latrines which differ not in terms of cost with Plan's latrines. So a person can dig a pit, line it with blocks and cover it and then put a ventilation pipe. The person may move about 10m and have the shelter built there. A 4" diameter pipe to carry the excreta into the pit is installed because the person does not like the shelter built on top of the pit in fear of, for example, collapsing of the pit. Therefore when you analyse the cost you find that it is not different from that of Plan's latrines.

Fundi 6: After staying for a long time I have discovered that every type of latrine is built according to the environment of the area. For example, the raised pit latrines where a person has to go up through stairs 12ft high going to relieve himself. The people who use these latrines have been forced by the environment to adopt this technology. You have a running stomach but you have to go through those stairs; this is because of the environment or it is the culture of the people in the area, they are used to that. On latrines that are built to discharge excreta through a pipe down hill, it is something to do with the environment; in our areas such latrines are not acceptable because the areas are so built up. Pit latrines are simple; once you have dug a pit, you have a latrine already. That is why some people just dig a pit, cover it with logs and the latrine is ready for use. They use drums and it is enough; use tree woven twigs for lining, it is enough. So when you reach a stage of lining the pit with blocks it implies that your economic level has gone up a bit. For instance the VIP latrines whose drawing I displayed for you, uses about 200 blocks 6" size for lining

the pit, and these 200 blocks can be afforded by a person of average income; about 20 bags of cement for 30 blocks each. For the slab which needs 2 bags of cement and about 5 dekes of gravel, which is affordable. Reinforcement bars 1" diameter for a length of 30m, and the 4" blocks, even by moulding them himself, the person can afford it for a single day for his latrine shelter. Being used to a technology is another factor for people going after a certain type of latrines. In Dar, many people are used to pit latrines. The flush latrine is for wealthy people; low income earners cannot afford them. We are not speaking much about the ecosan latrine; this is so because it is a new technology, many people do not know much about it, and what will happen once it fills up. People are aware of what happens with pit latrines, what they can do and where they can take the excreta after it is emptied, but with ecosan they do not know.

Fundi 10: The key reasons are based on: - Area where people live; they are forced to build latrines of a certain type - Economic capacity/condition of individuals - Knowledge in identifying/determining the costs of latrines. As other fundis have suggested that some people cannot afford the cost of ecological sanitation latrines, they have never used the latrine and they do not know what will happen later. As a result they go back to the pit latrine.

Fundi 8: After building the 6 sample ecosan latrines, I have not received any order to build a person an ecosan latrine. I think people in our area are not happy with this type of latrines.

Fundi 3: It is the pit and the floor, the shelter does not count much because one can use plastic sheets to make one.

Case	10
Municipality:	Temeke
Ward:	Keko Magurumbasi (ZamCargo)
Case description:	Trained sanitation providers

Quotations:

P 8: fundi's keko Veta(1).txt - 8:20 (349:353) (Super) Codes: [Hhlatpref]

Fundi 3: In this area of Mwanga because of the sand, many prefer the normal latrine. It depends on you as the fundi on what you will advise the customer but in most cases they prefer the round pit with bricks to the top. On top you can partition it into two rooms depending on what you and the customer agree on, and then you will know the best place to place the sink. If the fundi and the customer agree then there will not have any disagreement. Mostly in this area we use pit latrines.

Fundi 1: New designs are there. In the past people used to put stones for stepping on when using the facility but now they cover the hole and have a sink.

5.4 SIPS' skills and experiences of building latrines

Box 11: Field insight - Experience of building basket, tyre and drum latrines

UNTRAINED SANITATION PROVIDERS

Case 1
Municipality: Ilala
Ward: Mtakuja
Case description: Untrained sanitation providers

Quotations:

P 4: fundis vingunguti.txt - 4:5 (141:142) (Super); Codes: [skeplat] [tyre latrine]

Fundi 1: I built an Uswahilini one for someone who didn't have means. It is a tyre latrine.

Case 2
Municipality: Temeke
Ward: Mamboleo B
Case description: Untrained sanitation providers

Quotations:

P 2: Maboleo b untrained.txt - 2:36 (349:359) (Super) Codes: [pitlinning] [skeplat]

Fundi-10: The owner is required to have 2 or 3 drums, or even one. You dig a pit in relation the size of a drum (diameter), which would have its base cap removed so that it can allow water to flow in the ground. This type of latrine is widely used in rural areas and in urban areas where space is not available, so a person with little space can build a drum latrine, instead of lining with blocks, the drum takes the position of a block lining.

TRAINED SANITATION PROVIDERS

Case 3
Municipality: Ilala
Ward: Buguruni/Vinvinguti/Mbagala
Case description: Trained sanitation providers

Quotations:

P 7: trainednot supported(1).txt - 7:31 (259:263) Codes: [basket latrine] [skeplat]

Fundi 10: I have built a tyre latrine. The latrine is built in this way: - I started by digging a round pit, one-metre diameter to allow fitting in of the tyres. - One tyre was fitted into the pit to be followed by others. There were 23 car tyres. At the top I arranged tree logs (mingunguti), they are slender but very strong and they were 10. I used a tin (Kimbo margarine 1 kg tin) and fixed it between the logs for the drop hole. - One bag of cement was used to make the floor, a block shelter was built and the latrine was ready for use.

Fundi 7: Drum latrines: People dig a pit and fit in a drum and arrange wood logs to support weight. The problem is that the drum rusts without the knowledge of the user, that one day it will collapse endangering the life of people.

Case 4
Municipality: Temeke
Ward: Keko Magurumbasi (ZamCargo)
Case description: Trained sanitation providers

Quotations:

P 8: fundi's keko Veta(1).txt - 8:18 (303:306) (Super) - Codes: [skeplat] [tyre latrine]

Fundi 1: When making a tyre latrine, you dig a normal pit of about four feet and then place take the tyre, enter the pit, place it well and put soil on the side. Take another one and place it, continue with this process until you reach ground level, then you will have to use another tactic, break the stones on the sides and make the floor so that even you wouldn't recognize that it was lined with tyres.

Box 12: Field insight - Building brick latrines

UNTRAINED SANITATION PROVIDERS

Case 2
Municipality: Temeke
Ward: Mamboleo B
Case description: Untrained sanitation providers

Quotations:

P 2: Maboaleo b untrained.txt - 2:4 (34:37) (Super) Codes: [Pit latrine] [skeplat]

Fundis 1: A large part of Dar-es-Salaam city is sandy, and the main problem with Dar-es-Salaam is that the water table is very high, you just dig a little and you have water, or you dig, take out the water and build, so you can build and find that the water is high, this is the first problem. This means that after digging your latrine in Dar, you must line it from the base ground to the top. At the top you have to cover either with concrete or if you are putting 'mikoko' (mangrove) and then arrange your blocks and pour concrete or you may cover it with timber, tie with bars and pour concrete. But you would find that the pit is full even before it is put to use.

Fundi 4: You can work within the area you live, or for you may be taken to work in Mbezi, Sinza Bunju or go to Mbagala areas and you find that the various areas we are taken to have different soil conditions. For example if you go to Mbezi, you can dig a pit as deep as 14ft because Mbezi areas are different from other areas in Dar-es-Salaam. If you go to areas in Kinondoni - MwaNyamala district, in these areas a pit latrine does not go more than 5ft deep. You therefore find that only 2-3 days after it is built, a pit latrine starts flooding. So the owner refills this and starts another. Such occupational issues arise between the owner and you the fundi. Usually, latrine pits have to be dug during the dry season, from September - December but you cannot dig a latrine pit

in Dar in the months of March, April, and May or June. I think, depending on the environment, you may find the place where the pit is to be dug has clay, loam or sandy soils, so there is a procedure of how to go about it. With clay soil, a person may ask you to dig a latrine pit of 12ft or 8ft or even 16ft, you can dig the entire pit and then start lining. With sandy soil there is a way of building, you can dig 8ft, line and then continue digging deeper.

Fundi-5: For other areas, I conquer with the man. For an area like Mamboleo, it is possible to get a pit 18ft deep, it is a good area for latrines. There are other areas such as Kiwalani, you can dig 3ft and find water and houses are so close to each other, that when you want to dig a pit at specified depth and width you are going to fail. You have to apply other techniques of construction. You build 3 courses today and when you come tomorrow you scratch and the 3 courses wall drops deeper, you continue till you get 5 courses (about 3-4ft), then you build above ground and it will now have stairs but its lifetime is very short. Therefore building a latrine that can last 5 to 6 years is difficult. I agree with what he said, that as a fundi, I would advise a customer, but the customer would say it is impossible, it should be done that way to cut the cost, so I would go with the customer's request and build him a latrine, but its lifetime will be very short. If the pit collapses, you will have to take out the pieces of blocks and start afresh. There is 1 problem with the way blocks are laid, flat and in the upright position. You can build up to the 10th course and let the soil back in the pit, on the side of the wall (between mother earth and the wall), this can push the wall that it collapses. So you have to build it and let it stay for 1 day to allow stabilization of the wall before you allow back the sand and continue building.

Fundi-6: A person can use rocks, because when you line a pit with rocks, you are assured of a 'steel' (strong) latrine, so a wealthy person would tell you to line the pit with rocks from the base to the top and the rocks should be round, for a pit 10ft diameter and 12ft depth.

Fundi-7: A 12ft depth pit uses 300 blocks with 6 bags of cement; the 300 blocks are for lining only. If a person has enough space and would like to have the shelter not built on top of the pit but a few metres away, (this is copying from those of high class who use latrines that flush off the waste) so that he can flush the waste to the tanks built away from the shelter, or if he has no space to allow for that he would have the room built on top of the pit.

Before digging the pit in Uswahilini, you have to assess the capacity of the owner, one may tell you after you have dug the pit 'pour concrete onto the ground base' so you pour the concrete and start lining leaving relief holes where water can seep out about 4 or 5, you line to the top and ask again 'can we plaster it?' he would say do not apply plaster because he may be having problems, so he would say, 'cover the pit' he would then go to buy logs or reinforcement bars, and you would cover the pit.

Fundi-8: I have built drum pit latrine, tyre latrine, and direct pit latrine (lined with blocks laid either flat or upright for circular and rectangular pits). If you want a long lasting latrine, you have to lay the blocks flat and they have to be in pieces, when lining your round pit. But in Uswahilini, people

ignore other expenses as unnecessary but they are very important. If you 'plaster' the inside of the lining wall, it means you have added strength to it because no insects can harm the wall. Some last 10 and others 50 years. Therefore a lasting latrine is the one whose pit is lined with blocks laid flat.

Fundi-10: I built a pit latrine lined with stones, which was 12x6ft (length and width). I used earth mixed with lime as building material, I did not use cement from the bottom to the top (the lining work). I used cement when covering the pit. I built this latrine in Zanzibar. This type of lining is common in areas where stones are available. I have also built a round pit of 12ft depth and I used 350 blocks.

Fundi-12: You buy a culvert ring, you dig a pit and you drop the culvert ring, you get down the pit and dig deeper, you add another culvert rings. You can count a number of culverts you want, one on top of the other and then you dig deeper.

Case 3
Municipality: Kinondoni
Ward: Mamzese/Tandale
Case description: Untrained sanitation providers

Quotations:

P 9: fundi manzese and tandale(1).txt - 9:14(242:244)(Super) Codes: [stone pit line]

Fundi 8: In the past they used to build the stone ones but not any more. Stones are very expensive but in the past it was easier. One vehicle load would be Tsh.200 or 300 that's why we used to use stones but now there are no stones.

TRAINED SANITATION PROVIDERS

Case 4
Municipality: Ilala
Ward: Buguruni/Vinvinguti/Mbagala
Case description: Trained sanitation providers

Quotations:

P 7: trainednot supported(1).txt - 7:16 (153:158)(Super) Codes:[Pit latrine] [skeplat]

Fundi 6: Yes: - We build these common round pit latrines. The common round pit latrines but raised. Fundis go to the site with a plan already in the mind; in addition to that fundis help one another on technical know-how. Because some have been to college and some have been trained by organizations like Plan. I am going to explain in detail the type of latrines we used to build with Plan. When building these latrines, a pit of 3m is dug; the dimensions at the top are (190 x 160) cm after lining. Concrete of 6" size is poured on the ground base then you build one course of 6" blocks laid flat. After that, you lay 6" blocks in the upright position to the top. At the top you cover the pit with a 6" reinforced concrete slab. You go on to build the shelter using 4" blocks. You fix a door and a roof cover of 3 iron sheets. You put a ventilation pipe (PVC) of 4" diameter and 20ft

length.

Case 5
Municipality: Temeke
Ward: Keko Mwanga B
Case description: Trained sanitation providers

Quotations:

P 5: Keko Mwanga Fundi.txt - 5:46 (405:410) (Super) Codes: [Pit latrine] [skeplat]

M: Which type is especially built by you? R: Pit latrines; the ones that you dig a pit and cover it at the top and put logs together with a wall.

Box 13: Field insight - Building ecosan latrines

UNTRAINED SANITATION PROVIDERS

Case 1
Municipality: Temeke
Ward: Keko Mwanga A
Case description: Untrained sanitation providers

Quotations:

P10: FUNDIS NO. 7 VETA (2).txt - 10:163 (1883:1889) (Super) Codes: [ecosan]

Fundi 3: To build an ecosan latrine, you start as you are making a foundation like for a house, because there is a lot of water so you have to raise the foundation and then build a square 'four angled' structure with a partition wall in the middle. The substructure is then covered with a reinforced concrete platform installed with urine diversion squatting pans. Trap doors are also inserted at the back of the two compartments to provide emptying access.

TRAINED SANITATION PROVIDERS

Case 3
Municipality: Ilala
Ward: Buguruni/Vinvinguti/Mbagala
Case description: Trained sanitation providers

Quotations:

P 7: trainednot supported(1).txt - 7:17 (169:189)(Super) Codes: [Ecosan] [skeplat]

Fundi 10: I will explain about latrines, which do not have a pit, they are called ecosan latrines. Normally these latrines are built in areas with high water levels, not dry areas. A place is prepared where the latrine will be built; a foundation trench is dug. A foundation wall of 6" block is built about 1m high, from the ground. At the top, concrete is poured for a 6" slab. The concrete slab is cured for 3 days. On the fourth day, you start building the shelter using 6" blocks laid in the upright

position. In many cases the size is 5ft by 8ft. A partition is provided at the middle to allow for two rooms each with width of 3ft 9". After partitioning, logs (Mkurunge tree) are arranged; they are cut into 14 pieces. A concrete, 6" size, is poured, and is cured for 3 days. Prior to pouring the concrete, 3 pipes, 1" size and 8ft long are set of which one comes direct to the excreta pit, another comes where the bath place will be provided and the last piece is for the other excreta pit, because there are two excreta pits, one for each room. So the pipes are 3; two are for the urinal, and one is for the wastewater from the bath place. The excreta pits are provided with 4" size pipes, that when the concrete dries a little, the pipes would be removed so there will be 4" holes of 4" size; one is for the excreta and one is for ventilation, the same applies to the other pit. After 6 days the shelter starts to be built. Blocks of 4" laid upright are used for a wall of 8 courses. The side of the door has 9 courses and the rear side has 8 courses to provide for a slope of the roof. Four iron sheets are used.

Box 14: Field insight - Building pourflush latrines

UNTRAINED SANITATION PROVIDERS

Case 1
Municipality: Temeke
Ward: Keko Mwanga A
Case description: Untrained sanitation providers

Quotations:

P10: FUNDIS NO. 7 VETA (2).txt - 10:160 (773:777) (Super) Codes: [pour-flush] [skeplat]

Fundi 1: I have built a pit latrine of 12 feet, which is normal, you pour concrete, you put a sink, this normal sink, nowadays they put a sink, as they are afraid of large holes because people do throw large amount of rubbish, tins and other things but if you put a sink, only the excrement will pass.

Fundi 2: There you make a pit and in its hut you put a sink, it is not a flushing latrine, you put a pipe to the pit, so after defecating you just pour water to flush.

Case 2
Municipality: Kinondoni
Ward: Mamzese/Tandale
Case description: Untrained sanitation providers

Quotations:

P 9: fundi manzese and tandale(1).txt - 9:10 (204:205) (Super) Codes: [pour-flush] [skeplat]

Fundi 4: A flush latrine. There is also another type that you put a sink on the side, you build a structure on the side and then you bend a pipe which goes into the pit so you pour water to flush.

TRAINED SANITATION PROVIDERS

Case 4
Municipality: Ilala
Ward: Buguruni/Vinvinguti/Mbagala
Case description: Trained sanitation providers

Quotations:

P 7: trainednot supported(1).txt - 7:16 (153:158) (Super) Codes: [pour-flush] [skeplat]

Fundi 6: Yes: - We build these common round pit latrines. - Latrines which have pit separated from the shelter, they are called pour-flush - The common round pit latrines but raised. Fundis go to the site with a plan already in the mind; in addition to that fundis help one another on technical know-how. Because some have been to college and some have been trained by NGOs like Plan.

Box 15: Field Insight - Building WC latrines

UNTRAINED SANITATION PROVIDERS

Case 1
Municipality: Ilala
Ward: Kombo
Case description: Untrained sanitation providers

Quotations:

P 1: Dummy fundis.txt - 1:1 (21:26) (Super) Codes: [flush latrine] [Pit latrine] [skeplat]

Fundi 1: Yes, I have built latrines in Mtoni. There are two types of latrines: 1. Direct pit latrines- 12ft deep, lined with cement blocks, covered and provided with a drop hole. 2. Pit latrines with two chambers of 12ft depth for the big chamber and 7ft for the second chamber, which is small. The pits are separated from the room. The excreta material is taken to the small chamber through a pipe after flushing it with water. The difference is that with the direct pit latrine, the excreta material drops directly into the pit while with the flush latrine, the excreta material is carried away into the chamber outside through a pipe after it has been flushed with water. After the pit is dug 12ft deep, it is lined with cement blocks to the top (this is the big chamber). Reinforcement bars are arranged at the top and concrete is poured at the bars. The small pit is dug 7ft deep, at its base, concrete is poured, at the centre there is a trap.

Case 2
Municipality: Temeke
Ward: Mamboleo B
Case description: Untrained sanitation providers

Quotations:

P 2: Mabo leo b untrained.txt - 2:16 (167:171) (Super)Codes: [flush latrine] [knowlat]

Fundi-4: There are latrines, for example, for people with ample space, you dig a pit, line it to the top. There are people who do not like the wall built on top of the pit therefore they build aside two or three rooms; a bathroom, and a sink latrine, the sinks which are used outside, because you have sinks for in-house use and for the latrine located outside the house. Therefore after using the facility, the waste is flushed far outside into the tanks. There are sinks which are common, Asian type and European type (for sitting) and you cannot install them in an outside latrine, they are suitable for an inside latrine.

Case 3
Municipality: Kinondoni
Ward: Kwakupa
Case description: Untrained sanitation providers

Quotations:

P 3: paired fundi interview.txt - 3:3 (43:45) (Super) Codes: [flush latrine] [knowlat]

Fundi 1: There is the civilized type (the flush latrine), they have tanks, a good superstructure with a sink where people can relieve themselves. From the sink, the waste is taken to the station chamber, then to the septic tank. The way the flush latrine is constructed is not very different, it has a station chamber that is a 7ft deep pit, which receives waste from the sink, then sent to the septic tank. It has a depth of 15, 12, or 13 ft, depending on the size a customer wants, it may be 5, 6 or 8ft.

TRAINED SANITATION PROVIDERS

Case 4
Municipality: Temeke
Ward: Keko Magurumbasi (ZamCargo)
Case description: Trained sanitation providers

Quotations:

P 8: fundi's keko Veta(1).txt - 8:12 (226:231) (Super) Codes: [flush latrine] [skeplat]

Fundi 5: I would say that I have made different types like pit latrines the ones we call normal latrines where the waste goes into the pit. Eh, the second type is the one that you dig a pit outside the house but the rest of the system is inside the house, the ones people call "Master"; you use it inside the house without going out and transport the waste to the pit outside. Then there are the modern ones that you flush inside the house, these are for people who are rich (who are in a position to afford one).

5.5 Field insight into SIPS experiences of building latrine superstructure

Box 16: Field insight - Building latrine superstructure and rehabilitation

UNTRAINED SANITATION PROVIDERS

Case 1
Municipality: Ilala
Ward: Kombo
Case description: Untrained sanitation providers

Quotations:

P 1: Dummy fundis.txt - 1:19 (129:130) (Super) Codes: [latsupstr]

Fundi 6: It depends, some build it like a room with cement, and others put a CIS enclosure (Corrugated Iron Sheet). Some put a roof cover and others do not, because some are capable of meeting the costs and some cannot, so they leave it plain.

Case 2
Municipality: Temeke
Ward: Mamboleo B
Case description: Untrained sanitation providers

Quotations:

P 2: Maboleo b untrained.txt - 2:24 (236:249) (Super) Codes: [latsupstr]

Fundi-7: The shelter may consume about 200-350 blocks depending on how big it is. About 3, 4 or 5 corrugated iron sheets will be used for roofing. Some pay for timber, [3 (4x2)"; 3 (2x2)]; nails (0.5-1 kg), logs, tying bars (koa).

Case 3
Municipality: Ilala
Ward: Mtakuja
Case description: Untrained sanitation providers

Quotations:

P 4: fundis vingunguti.txt - 4:7 (210:211) (Super) Codes: [latsupstr]

Fundi 4: It depends on the individual and the ability; there are some who use bricks and other use nylon sheet as they are not able.

5.6 Field insight into SIPS experiences of emptying latrines

Box 17: Case history - Emptying of full pits

UNTRAINED SANITATION PROVIDERS

Case 1
Municipality: Temeke
Ward: Maboleo B
Case description: Untrained sanitation providers

Quotations:

P 2: Maboleo b untrained.txt - 2:82 [Fundi-5] (708:713) (Super) Codes: [latempty]

Fundi-5: There are two ways of emptying, like it had been said. If there is poor space, we go back to the same problem; it is required to dig a pit of 10ft deep. A trench is dug to connect the pit to the full latrine to allow excrement to flow into the fresh pit. The fresh pit would then be covered and the latrine will be put in use again. For others, you will dig a pit and dismantle the cover (open it) and using a bucket, you dip it inside and take the waste into the other pit. All these depend on space and if there is poor space, this is the way we do it in Uswahilini.

Fundi-11: Like Mzee has said about lack of space and poor economic conditions of people in Uswahilini, these people force something which is common in these areas. You build a person a pit latrine, either round or rectangular, and if it is 12ft deep, when you reach a depth of 7 or 8ft, you are supposed to connect a 4" PVC pipe. Many houses in Uswahilini especially Tandale and Manzese are surrounded by drains, so you will take the pipe from the pit into the drain. You will be using the latrine as a bathroom, and the water will never fill up. When the water in the pit reaches the level of the pipe, it would flow out through it. In other cases, the end of the drain pipe is often blocked with pieces of cloth. When it rains the owner would stir the waste in the pit and open the drain pipe at the end to discharge the sewage. That is why you can find a house with no space and the latrine there is never emptied. This is what they do in Uswahilini, Manzese and Tandale.

Fundi-7: In most cases the latrine emptier digs a new pit near the full latrine if there is space. The contents of the full latrine are then removed and emptied into the new pit. If the latrine owner wants to verify the emptying, they do remove the pit cover. They empty the pit latrine to the bottom. The owner can then be called to verify that the pit has been completely emptied.

Fundi-10: For those who were lucky to have a concrete lined base in their pit, they would tell the emptier to dismantle the entire pit cover and empty the latrine until they reach the concrete base. In other places like Zanzibar, people put a special mark, for instance, a rock or a plastic bucket at the bottom. So the emptier is told to empty the pit till the bottom, and when he is through, he would be asked what he found at the bottom of the pit, if he mentions something else other than the mark, the owner would know that the man did not reach the bottom. When asked, 'did you reach the concrete?' and he says 'yes', then he would be asked, 'what else?', if he mentions the mark, then the owner would know that the man reached the bottom.

Case 2
Municipality: Ilala
Ward: Kombo
Case description: Untrained sanitation providers

Quotation:

P 1: Dummy fundis.txt - 1:35 [Fundij] (224:226) (Super) Codes: [latempty]

Fundi 1: With cars, the sludge is not finished but a frogman takes the whole waste outside.

Because the sludge is hard so it will be difficult for the truck.

Fundi 2: The government is not aware of the way we do it, what they know is that we use cars. I think they should provide cars because the way we do it is not good for our health. The thing is it is possible for cars to be used only for emptying the flush latrines, but the pit latrine problem remains the same, cars cannot empty it.

Case 3
Municipality: Mixed
Ward: Mixed
Case description: Untrained sanitation providers

Quotation

P 6: Frogmen - FGD.txt - 6:2 [Frogman] (11:16) (Super) Codes: [knowlat] [latempty]

Frogman 2: It is like this, a person with a 12ft deep pit latrine that is full can call on you. The person would tell you that "my latrine has 'floated' and I want the waste taken out because I do not have the capacity to build another latrine, therefore let us agree on how to work this out". When you have reached an agreement, you introduce your technology by asking the person if he has a place to dig a pit, and to provide 2kg of salt and 5l of kerosene. The cover of the full latrine is broken and the prepared salt/kerosene solution is poured into the pit latrine. The solution is then left in the latrine overnight to act on the excrement. You would come the next day to find that the excrement has blackened and is muddy. Then you would start taking out the waste into the new pit you have dug using spade and bucket.

Frogman 3: I pour the solution in the morning. The salt and the kerosene solidify and deodorise excrement then emptying becomes easier with the use of a spade.

Frogman 5: The time taken to empty a latrine depends on how committed to the work you are. If you start work at 5am, by 14 to 15hrs you should be through. But people do not understand that it is the cloth materials that they dump into the pit which consume a lot of emptying time. These do not decompose and if you find one, it will take you a long time to take it out. In general the environment of the work is very bad; we just thank on God when working. Sometimes, we light fire to the pit so that the excrement dries. After pouring salt and kerosene and lighting fire, we wait till the next day in the morning before we start emptying.

TRAINED SANITATION PROVIDERS

Case 4
Municipality: Temeke
Ward: Keko Mwanga B
Case description: Trained sanitation providers

Quotations:

P 5: Keko Mwanga Fundi.txt - 5:35 (318:320) (Super) Codes: [latempty]

Fundi 1: Fine, Mzee Hassan is my lecturer "he said a lecturer to mean teacher". We use a certain local/traditional medicine/chemical to dry the sludge in a latrine. It takes about 5 minutes to be dry and after that we take out the contents leaving the pit latrine empty. It is ours. It is a local medicine, but there is another one, which is given to us by the people dealing with dirty water DSSD.(Dar es Salaam Sewerage and Sanitation Department).

Fundi 2: The equipment used for emptying are two pieces of rubber if there are two openings, you light fire on both openings and the rubber smoke will get into the latrine. The rubber ashes will make the latrine water boil and sink down. So, till you finish the rubber, the drying activity will be over. Then you go to the kiosk and buy lemons and put the juice in the latrine. It takes away the bad smell and this is just my thoughts because if fish is rotten, just spread lemon juice on it, all the bad smell will disappear in that very minute. This is how my using of lemon juice began and I have been successful with this.

Fundi 3: Problems when emptying latrine: Problems are many, for example the clients sometimes lie knowing that the emptying cost do consider the size and depth of the latrine. One can tell you that my latrine is full, I want you to empty it, and so you tell him the price and the depth for that price. He will tell you, ah it is not even 7 feet, after all I bought that house, it is a very small latrine, may be that's why it is full. When you look at yourself, you find that you are hungry, saying 7 feet is 50,000 to 60,000 is hard because there are other hungry people who can do it for less, so you can ask him to give you 20,000/=. You empty up to 7 feet and then realise that it is a 12 feet latrine. If you try to tell him that the latrine is 12ft not 7ft, he will say, "I did not know, but I already told you that I bought this house?" Up to here, you are lost; do not expect to get extra payment that is the first problem. The second problem is, you can be promised to be paid after finishing the job and yet you have not. Thirdly, in emptying, the latrine pit can collapse. Our relatives died in that way and our fellow masons died not once, not twice.

Case 5
Municipality: Ilala
Ward: Buguruni/Vinvinguti/Mbagala
Case description: Trained sanitation providers

Quotations:

P 7: trainednot supported(1).txt - 7:49 [Fundi 6] (403:406) (Super) Codes: [latempty]

Fundi 6: Yes, there are areas where a car can drive through and empty latrines, and there are areas where owners dig pits beside filled up latrines and take out the excreta into the fresh pits, and often latrine takes about 10 years to fill up. There is another technology; there are small trolleys (Mappet), which get through into the interior of out areas where cars cannot drive through. So they come and empty the pit and leave.

Fundi 7: You dig a pit, a small distance from the latrine, which should be bigger than the latrine pit. Then you dig a trench connecting the two. The excreta at the bottom of the latrine would have solidified like tarmac so it cannot be flow. So you have to break the pit cover using a chisel, and when you find the layer of excreta that has solidified, you pour a gallon of kerosene and water and stir to soften and liquefy. After that you continue to take the excreta into the fresh pit.

Fundi 9: Accidents some are fatal do happen whilst emptying. The latrine pit may have developed cracks and during dismantling of the cover, the lining wall may weaken and crumble and the emptier can fall into the pit. This happened to somebody I know.

Fundi 12: People who empty latrines do not put on any protective gear e.g. gloves, gumboots etc. The working environment is dangerous but they have to work because they need the money. As a result these people develop health problems. I know of an injection which has to be administered to emptiers, but they are supposed to put on gloves, gumboots etc, but what I have been seeing are pit emptiers playing with excreta with bare hands. Later they suffer from skin diseases and look like victims of HIV/AIDS.

5.7 Sources of SIPS skills

Box 18: Case history - Sources of SIPS' latrine construction skills

UNTRAINED SANITATION PROVIDERS

Case	1
Municipality:	Temeke
Ward:	Mamboleo B
Case description:	Untrained sanitation providers

Quotations:

P 2: Maboleo b untrained.txt - 2:26 (257:258) (Super) Codes: [SIPS skillsource]

Fundi-7: For me, when I was working with the Municipal, we use to build latrines for kiosks and market places that is when we knew how to build a long lasting latrine, a temporary one and a normal one.

Fundi-3: I learnt from a fundi mason whom I worked for as a helper for about 4 years. I used to observe everything. Later on I came out knowledgeable about building a house and latrine because the two are similar. I was observant, that fundi was humble and he liked to see me become a fundi so he started training me. The first day he gave me a trowel and started leading me. I started with building houses, and then a latrine followed after a while.

Fundi-12: I learnt from my father, years in the past, later I became a constructor. I came to train here at Changombe (now VETA), in 1978 to 1981. I got Grade 1 then and I took a subject called Drainage systems, meaning 'Latrines'.

Case	2
Municipality:	Kinondoni
Ward:	Kwakupa
Case description:	Untrained sanitation providers

Quotations:

P 3: paired fundi interview.txt - 3:5 (52:54) (Super) Codes: [SIPS skillsource]

Fundi 1: Through building latrines for different people and living in different areas with different capacities as in the rich and the poor, you get to build a number of latrines of different kinds.

Fundi 3: Through working with a fundi at Wade Adams Construction Co. Ltd. He used to tell me things about dimensions etc. After three years I came out a complete fundi.

Fundi-2: I have never attended any formal training; I gained my knowledge by being a helper working for a number of fundis.

Case 3
Municipality: Ilala
Ward: Mtakuja
Case description: Untrained sanitation providers

Quotations:

P 4: fundis vingunguti.txt - 4:20 (415:416) (Super) Codes: [SIPS skillsource]

Fundi 3: After training with a fundi and being well conversant I ventured out on my own. I was with him for two years and a company for one year.

Fundi 1: We would go and look for casual jobs after school. There was this old man who would tutor us in his home. He told me that if I was keen he would teach me step by step. I like the work and that is how he became my teacher since 1983. I came to Dar es Salaam in 1985 and I joined my uncle.

Case 4
Municipality: Kinondoni
Ward: Mamzese/Tandale
Case description: Untrained sanitation providers

Quotations:

P 9: fundi manzese and tandale(1).txt - 9:15 (253:256) (Super) Codes: [SIPS skillsource]

Fundi 7: From a construction company. It was a 'chamber latrine' (the pit is inside the house and the tank is outside). You use the inside and then it flushes on the outside.

Fundi 8: I used to work with my brother but I didn't expect to be a fundi but I did because he used to oppress me, actually he was my cousin. I used to do a lot of work but the money was little. I was very bitter but I would look at what he was doing. I bought my tools and asked him to let me build and then he will check whether I have done the right thing or not. He agreed and since I am a fast learner, I didn't have peace so I looked for an assistant and started working with him and I am paid well.

Fundi 1: My father taught me. I would accompany him to dig the pits but unfortunately he passed away in 1992 but I had already become a fundi.

Case 5
Municipality: Temeke
Ward: Keko Mwanga A
Case description: Untrained sanitation providers

Quotations:

P10: FUNDIS NO. 7 VETA (2).txt - 10:24 (269:274) (Super) Codes: [SIPS skillsource]

Fundi 1: Okay, most of the time people do get to know things after seeing them from other people before they start masonry activities. We see people making pits and then they start building. If you

ask them you will be told that there is a depth starting at this centre then you make a circle as the centre, follow the circle so as to make an easy passage of the excrements and the equalization is made twice. That's how we see them doing that before we started that work.

Fundi 2: Situation forces you to learn, you see. I got the skills from the sites; a mason has to teach you so that you can know. It is only a very small percent of people who have gone to VETA and studied about masonry.

Fundi 4: There was a certain mason building in our house. It was not a latrine, but he was building a house. He was building a house with no assistant, and I was there jobless, so he told me to work with him and he will pay me. I came to work with him, he was coming in the morning and leaving in the evening, we went that way until our house was completed. After he taught me for a week I started being interested.

Fundi 5: I was a VETA student in Dodoma, luckily in that college that I was schooling, we were taught using small bricks which are burnt, always we were taken to the teacher's site which was a bit far from town, he taught us how to make foundation, how to set a house, you see? It is where I was taught and knew masonry activities in general. I came to learn how to build latrines from my friend because all the skills almost 25% we get from school.

TRAINED SANITATION PROVIDERS

Case 6
Municipality: Temeke
Ward: Keko Mwanga B
Case description: Trained sanitation providers

Quotations:

P 5: Keko Mwanga Fundi.txt - 5:18 (145:145) (Super) Codes: [SIPS skillsource]

Fundi 1: Through building them to Indians houses.

Fundi 2: Through building and disludging in Keko and Temeke.

Fundi 3: From my grandfather who later took me to the Indians where I was taught everything.

Fundi 4: I got skills from Pugu Road construction through Maredta Company in 1979 and in 1982 in Iringa region from a certain building company. After that I came back to Dar es Salaam as a mason. In the same year 1982 Mzee Hassan taught me how to desludge the latrines.

Case 7
Municipality: Ilala
Ward: Buguruni/Vinvinguti/Mbagala
Case description: Trained sanitation providers

Quotations:

P 7: trainednot supported(1).txt - 7:16 (153:158) (Super) Codes: [SIPS skillsource]

Fundi 6: Fundis go to the site with a plan already in the mind; in addition to that fundis help one another on technical know-how. Because some have been to college and some have been trained by organizations like Plan. I was trained to build latrines by my brother who was a construction Engineer. We travelled and worked together, so I learnt a lot of things concerning construction. I have never received any formal training on building latrines.

Fundi 8: I attended a training workshop conducted by WEPMO. They trained us on ecosan latrines which we went on to built in the areas we live, as sample. Other than that, I have never received any formal training on latrines.

Fundi 7: I learned construction in Tanga at a Vocational Training Centre, and have Grade II in Masonry. I learned about latrines in Tanga and attended training on ecosan latrines conducted by WEPMO.

Fundi 12: I attended technical training at the National Vocational Training Centre, NVTC now Vocational Education and Training Authority, VETA. I started with basic training and attained Grade I in Plumbing. I was trained on latrine construction, plumbing in general, water supply and house fitting. On different types of latrines that I know of, this has come through practical or field work; for example, I saw the pit latrines with a lined pit in Gongolamboto, I saw the raised pit latrines (people start building a latrine pit from the ground level) in Mwananyamala, where people have to climb stairs before getting into the latrine. I experienced this in Buguruni too. But the problem is, you find that many latrines have their walls discharging water which flows onto the ground, and cholera is a problem in these areas.

Fundi 5: I received training at Chang'ombe NVTC in 1982. With regard to latrines, I learned the following types: flush latrines and pit latrines with the pit lined with blocks. We were more inclined to learning how houses are built; latrine building was only a part. Plan International came to enlighten us on latrine building, dimensions with a drawing and how to go about building the facility.

Fundi 3: I have never received any formal training on building latrines, but since 1990 I was working side by side with my father who was a fundi mason. I was given basics on building latrines by Plan International. They based much on pit latrine construction. My father taught me how to build pit latrines with round pits lined with either blocks or rocks.

Fundi 4: I have never attended a formal training on building latrines. I learned to build latrines through working with my father who was a contractor, building big houses. I too received the basics on building pit latrines and reading drawings by Plan International.

Case 8
Municipality: Temeke
Ward: Keko Magurumbasi (ZamCargo)
Case description: Trained sanitation providers

Quotations:

P 8: fundi's keko Veta(1).txt - 8:27 (415:421) (Super) Codes: [SIPS skillsource]

Fundi 2: The latrines are different, personally I learnt while doing masonry in a technical college in my village. It is on the border between Tanga and the Coast; there is a college that offers different courses like carpentry, masonry etc. You can join after primary or secondary school, they teach you that if you are putting up a house then you will need to put a latrine and vice versa. But I gained experience by working on other things or observing other mafundis. As a fundi you should be cunning enough in order to know how you will save your customer some money. You gain experience by observing others who have been trained.

Fundi 5: I had trained for ordinary latrines while doing masonry. I trained for the ecosan after it was introduced by Water Aid, it is a new technology and I like it because it is my hobby. Since it is my hobby I didn't have a problem acquiring the skills, I learnt very fast and gained the skills.

Fundi 1: From other seasoned fundis and other places where fundis come together. I gained mine from work as I started working many years ago in the village and at Baby Farm.

Fundi 4: I took five years in college but for the Ecosan latrines it took only five days.

Fundi 3: I learnt from a Technical secondary but when I finished school I didn't choose this line of work. I worked in different companies. When I left work I decide to take this line of work instead of going through hard times so I hung around seasoned mafundis for six months, and then they gave me a job as I continued learning, I am a fast learner so I picked things here and there and at the seminar.

5.8 Process of delivering sanitation services to households

Box 19: Field insight - Finding new clients

UNTRAINED SANITATION PROVIDERS

Case 1
Municipality: Ilala
Ward: Kombo
Case description: Untrained sanitation providers

Quotations:

P 1: Dummy fundis.txt - 1:39 (245:251) (Super) Codes: [finding new clients]

M: If one wants your services, how do they contact you?

Fundi 1: The whole community knows me so they know where I can be reached. They get to know me through others that I built latrines for, but I do not have anything to show them.

Fundi 2: A relative of a potential customer saw me and told me to contact the relative for a job offer. I went there and we agreed on the work, how he wanted it done, the depth of the pit, lining and covering the top, and that would be all. We agreed on when to start and the availability of the materials.

Fundi 3: People see when building, a person may approach you and ask you to build him a latrine in a week or so.

Case 2
Municipality: Temeke
Ward: Mamboleo B
Case description: Untrained sanitation providers

Quotations:

P 2: Mabileo b untrained.txt - 2:10 [Fundi-7] (95:101) (Super) Codes: [finding new clients]

Fundi-7: This depends on where the customer is coming from. A customer may come from Mbezi and is directed to a certain fundi that can assist him with his problem at a cheaper cost. So you can go to Mbezi, and when you are through, another customer comes because he is attracted by your work. Such a thing happens in relation to how you do your work. More so, the town area is fully built, now people are building houses in Boko, Mbagala, in the outskirts there are no people there, we fundis live in town, which is why we have to go and work there and vice versa.

Fundi-12: Getting a job is being familiar with where you live and being known as a Fundi by the whole street. The way you work will give you other work accordingly. Getting other work depends on yourself, if you work nicely, you would not have problems, you live nicely with people. That's why we say you can work here today, but will be upcountry tomorrow, Mbezi, Sinza, Temeke, Mbagala, Depending on how you do your work. Sometimes we get work through searching for customers and vice versa.

Fundi-3: How this works for instance, I come from Yombo, I would come to Keko to do my work. When passing by you would see the work, and because you know the owner you will ask where he/she got that Fundi. He will tell you that he is a latrine Fundi, I got him from Keko. You would then tell him that you like the Fundi to work for you. He would then go after the Fundi in Keko, he would come and do the job, his popularity will widen. In many cases, when they see where you work, they would approach the owner and ask how this is. They would be informed how it is. A person may say "I will call him for you so that you talk to him directly" so you come and make agreements.

Case 3
Municipality: Kinondoni
Ward: Kwakupa
Case description: Untrained sanitation providers

Quotations:

P 3: paired fundi - 3:31 [Fundi 1] (240:242) (Super) Codes: [finding new clients]

Fundi 1: Because we are fundi masons who are low income earners, it is difficult to think of another way for people to know us other than knowing us as fundi masons. If we were proficient fundi masons, we would have offices, but we do not have the capacity to establish an office.

Case 4
Municipality: Ilala
Ward: Vingunguti
Case description: Untrained sanitation providers

Quotations:

P 4: fundis 1 vingunguti.txt - 4:32 (696:696) (Super) Codes: [finding new clients]

Fundi 4: If they see you building in the home area they become aware that you know how to make a latrine. Even if somebody has never seen you building a latrine, they will just know that you can dig a pit and build. Someone comes after you at home and offers you a job and then he tells you go to his place. After I completed I asked him whether he was satisfied with the work. He was and I said to him, if you like it and if someone asks who built it, please just refer them to me.

Fundi 6: There are "camps" for mafundi and everyone knows that you can get mafundi there. The camps help us because if someone needs a fundi, he just goes to the camp and make two or three offers and it is easy to access. Some of the mafundis get work this way.

Case 5
Municipality: Kinondoni
Ward: Mamzese/Tandale
Case description: Untrained sanitation providers

Quotations:

P 9: fundi manzese and tandale(1).txt - 9:37 (476:479) (Super) Codes: [finding new clients]

Fundi 3: Some people can inquire from the fundi if they like the work and then they come looking for you. Another one is the relationship you have with the customer and he will recommend you to his friends. In most cases that is how we get customers.

Case 6
Municipality: Temeke
Ward: Keko Mwanga A
Case description: Untrained sanitation providers

Quotations:

P10: FUNDIS NO. 7 VETA txt - 10:103 (1266:1270) (Super) Codes: [finding new clients]

Fundi 1: If you are building and a client gets interested, he will ask for a person who built that latrine, I need him. He will say to the owner, Mr. I saw a builder building your latrine I need him. The potential client is given the contacts for the fundi and where to get him. This is how I get work from new clients.

TRAINED SANITATION PROVIDERS

Case 7
Municipality: Temeke
Ward: Keko Mwanga B
Case description: Trained sanitation providers

Quotations:

P 5: Keko Mwanga Fundi.txt - 5:96 (1097:1108) (Super) Codes: [finding new clients]

Fundi 1: All the masons in Keko don't have posters or any other means for information like phones so they are recognized in two ways; first the low-payment (cheaper price) and second, being trustworthy in doing their jobs. If you charge high, the clients will run away from you so you have to be trustworthy as most masons in Keko Mwanga have a tendency of stealing cement or other building materials sometimes they do a job and before it is completed they turn to another client, so if you are trustworthy you will be easily recognized. After completing the job, you become free as you are not in debt, and even if the client you have built a latrine for will not pay you, he will connect you to another person to do another job. Then it is hard for you to remind him of the debt because he has connected you to another job, and this is the way we are being recognized in Keko Mwanga.

Fundi 2: As it has been said by Mr., sometimes it just depends on the experience of the clients, for example if you have built well, there will be no problem he can connect you to his friend who will be in need of a mason.

Case 8
Municipality: Ilala
Ward: Buguruni/Vinvinguti/Mbagala
Case description: Trained sanitation providers

Quotations:

P 7: trainednot supported(1).txt - 7:108 (799:806) (Super) Codes: [finding new clients]

Fundi 6: Things change according to the environment. In the past people were looking at the work you did, a house built by you, if impressed, they would look for you and we used to get orders through that. We now look for work, when you find a place where building work is going on or there is planned construction works to start, then you do not stay far. If you just sit there and wait for customers to come, you will never get a place to work.

Case 9
Municipality: Temeke
Ward: Keko Magurumbasi (ZamCargo)
Case description: Trained sanitation providers

Quotations:P 8: fundi's keko Veta(1).txt - 8:7 (191:193) (Super) Codes: [finding new clients]

Fundi 2: I think because of the activities that I had sometime back in our estate of building ecosan latrines, so people became aware and wanted to change their latrines so many will come looking for me thinking that I still make them. So I reconstruct their latrines that are problematic. All this time I was constructing latrines and the people like my work so they come to me for advice. I build the way they want and also advise them according to the area. I wouldn't say the last ones because I am still continuing with construction of the ecosan latrines. I trained when they introduced the new technology at Water Aid to support the community. These were the latrines that I was putting up, and there was no financial gain, this was to be made from our work on the ecosan. The second one was in my area because they know me as a mason so I get tenders from people who want to improve on theirs.

Fundi 4: I think these are the only ways because normally fundi should eh... when you finish a job you should get another one that should not be the end. This is because many fundis when they get a job and complete it and someone passes by, he will ask who made the latrine for you, you will say Mr. Emmanuel. You see already he is being referred to as Mr. Emmanuel. When he leaves there he won't have to think a lot, and that's how most fundis get in touch with their customers. If the work is good and it is not just latrines but also houses, when they complete the work, they get some more.

Box 20: Case history - Negotiating labour costs and contracting

UNTRAINED SANITATION PROVIDERS

Case 1
Municipality: Temeke
Ward: Mamboleo B
Case description: Untrained sanitation providers

Quotations:

P 2: Maboleo b untrained.txt - 2:123 (982:985) (Super) Codes: [decision making]

Fundi 12: First you meet and you will be shown the site, you look at the environment, you make agreements on charges, you go to buy the materials, you bring people to dig the pit and you start building. The type of latrine is related to the amount of money a customer gives a fundi. If the customer has Tsh200,000, 300,000, 500,000, 600,000 or 700,000, that is when you can decide on the type of latrine. So the decision depends on the customer being able to afford the cost of a certain type of latrine.

Case 2
Municipality: Kinondoni
Ward: Kwakupa
Case description: Untrained sanitation providers

Quotations:

P 3: paired fundi interview.txt - 3:6 (59:62) (Super) Codes: [decision making]

Fundi 1: Yes, we do advise the client because you need to tell the customer which kinds of latrines suit his kind of place. The type of soil also matters so is the cost of a particular latrine. So the customer will decide according to what he can afford. The 1st meeting is used to finalise agreement, then a dialogue about the materials. Agreements are on lining the pit, looking at the pit depth, and things like that, thereafter, we looked at the materials then I made the estimates for the whole job.

Fundi 3: Normally, when a person calls you, they would have prepared some blocks, and then they would ask you how much it would cost for a certain latrine and the dimensions. So as a fundi, you would make clarifications between the labour charge and the cost of the materials, the customers here would like to know because we use logs, but not shutters; concrete and reinforcement bars for the rich, and on covering the pit, the number of bags needed, things like that.

Case 3
Municipality: Ilala
Ward: Mtakuja
Case description: Untrained sanitation providers

Quotations:

P 4: fundis vingunguti.txt - 4:57 (1129:1135) (Super) Codes: [Hh negotiation]

Fundi 1: You have agreed verbally, there is no written note; after you dig the following day he will ask how much is left. You tell him 1ft, add 2 – 3ft, it is not as deep as I thought. That is another problem that arises after you have had the initial talk.

Fundi 2: When you are building, you agree on the price, basically you agree for every stage. Building using bricks is a different price, you might include it later but every stage you have to agree. When you get to the ground level, you cover it and then you are done. If he wants the super structure, that's another agreement.

Fundi 3: Problems can also arise on when you have agreed that he will give you the money. You find the prices have gone up, probably on cement; the prices go up form time to time. So you might find that when you entered into an agreement there are different problems that arise especially if it includes the purchase of materials.

Case 4
Municipality: Kinondoni
Ward: Manzese/Tandale
Case description: Trained sanitation providers

Quotations:

P 9: fundi manzese and tandale(1).txt - 9:44 (521:524) Codes: [Hh negotiation]

Fundi 2: He will want to know how long it will take for you to put up the latrine. You then tell him what you will need in order to complete it and maybe tell him it will take two weeks. The time will depend on him if he has the means and some of them can be very strict. Sometimes the fundis work on two different things like he might be working here up to three quarter and then leaves for another site so that it is not taken up by someone else. Yes time is a must. The customer will often ask how long it will take for you to finish his work that is the first things. You will tell him everything that you require so that you don't start running out of materials, so time must be in the contract.

Fundi 6: It depends on the customer. There are some customers that would not trust you without a contract. You have to have a written contract in terms of payment system, for example to be paid in three phases - when you start working, in the middle of the work and after completing the work, and it has to be in writing.

TRAINED SANITATION PROVIDERS

Case 5
Municipality: Temeke
Ward: Keko Mwanga B
Case description: Trained sanitation providers

Quotations:

P 5: Keko Mwanga Fundi.txt - 5:54 (1075:1084) (Super) Codes: [Hh negotiation]

Fundi 7: The first hardship is that we are always not sure of being paid due to the tendency of Keko clients, I do not know if the problem is due to the large number of masons in this small area. The masons have no rights to remind the clients of the debts. That's a normal game in Keko Mwanga. When making agreements, we consider getting a job first because we are so many, so when a client ask on the building cost, you start trembling because if you give-out a high price/cost, he will go to somebody else and get the service for a lower cost, so you have to agree the same price. The client will start telling you, I know you well, you built so and so a latrine, up to here you will have to reduce the cost. You can start with TZS. 40,000 but you will come down to TZS. 30,000

Case 6
Municipality: Temeke
Ward: Keko Magurumbasi (ZamCargo)
Case description: Trained sanitation providers

Quotations:

P 8: fundi's keko Veta(1).txt - 8:55 (720:729) (Super) Codes: [Hh negotiation]

Fundi 1: He will tell you that he wants a latrine and then you will agree on the terms. You agree on the work because you cannot work for free. I will tell him how much it will cost him. He will tell me how much he has and if it is a satisfactory amount then I will work for him.

Fundi 2: I think the first thing is that I will listen to what he has to say and what type of latrine he wants, because you would not know what type he wants. You might say that you will charge TZS2000 but the work might be TZS5000. This will be after learning how deep the pit should be, you might need to get people to help you, it also depends on the area as some areas are difficult. After you have been to the area, let's say like Kichanga Chui which is a difficult area, he might ask you to dig a fifty feet deep pit and you have already agreed on TZS10, 000.

Fundi 3: After I have listened to what he has to say, I will look at the place and see what kind of latrine is best suited for that place because I am expert I will know best but there are some customers who argue a lot but since it is his money I will just build the way he wants.

Box 21: Field insight - Costing latrines

UNTRAINED SANITATION PROVIDERS

Case 1
Municipality: Ilala
Ward: Kombo
Case description: Untrained sanitation providers

Quotations:

P 1: Dummy fundis.txt - 1:22 (148:150)(Super)Codes: [labour cost]

Fundi 1: It was TZS35,000 and the size of the latrine was 10ft deep, and my payment was for digging the pit, lining the pit, I didn't do the superstructure, the owner erected corrugated iron sheets and was not able to put up a block wall.

Fundi 4: I billed him TZS35,000/-, considering the digging and the lining work, there are different soil conditions, the good and the difficult. It takes 1 day to dig a pit in good soil, and the second day is for lining, but it takes 4 days for the difficult soil just for digging. This cost covers labour for digging the pit, lining and covering it.

Case 2
Municipality: Temeke
Ward: Mamboleo B
Case description: Untrained sanitation providers

Quotations:

P 2: Mabileo b untrained.txt - 2:60 (540:546) (Super)Codes: [labour cost] [latcost]

Fundi-10: The rock latrine cost less than the round latrine with the block lining. Because the rocks are available, and at a cheap price. For example the pit of 12ft depth and 6ft width required 2 trips of rock by a lorry, and 1 lorry costs TZS35,000, which means for 2 trips, the total will be TZS70,000. For lime, you can use 12-15 bags of lime of 50kg each, and earth. Therefore for that pit, from the bottom to the top covering the cost was TZS120,000 inclusive of labour charges. But the pit is charged separately, the fundi can dig the pit or another person can dig it. You charge FOR the lining and the covering only. The drum latrine is cheaper, but it is temporary, you can use it for a year or two. For the one I built, the owner had obtained the drums at a cheaper price, TZS10,000 each, which means TZS, 20,000 was spent on the drums, and my labour charge was 20,000/-, so it costed him TZS, 40,000, with covering the pit, the total cost was TZS60,000.

Estimating the cost of a block latrine would be difficult because the owner used to go and buy the blocks somewhere. I am not sure of the price per block in different areas; some were selling 1 for Tzsh300, 400 or 500 depending on the quality of the blocks.

Fundi-5: It is difficult to build a latrine at a very low cost, as a fundi, I was toppled over by earth. There are areas with good soil conditions and others have sandy soils. When you are underground, it is like being in a grave, when you bend and continue building, there might come a time a land

mass detaches itself from mother earth and crumbles without your knowledge. So costs of latrines with the poor conditions we are living under, you would be asked to make a discount but the cost of materials the owner has bought is TZS300,000. If you the fundi tell him to give you TZS70,000, he will tell you he has got 30,000. Minimizing the cost can be done in this way, if you are living together, fine, if a person asks you to lower your charges, you will feel shy to deny him that. If you have said your charge is TZS100,000 and the customer suggests 80,000, then you will build him for that amount because it is your means of living.

Fundi 6: I would like to contribute, wherever we go, we end up at financial capacity and space. One may have ample space but with no money, so he will do the thing that is within his reach, therefore a temporary latrine of two drums, but if you analyse the cost of two drums, at present it is TZS15,000 each, which means TZS30,000 for two drums. You will build two or three courses of a block wall for the logs to rest on, one log is sold for TZS3,500 and for a drum latrine, 3 or 4 logs are required or you can cut and make pieces. But if you have money you cannot go for a drum.

Case 3
Municipality: Kinondoni
Ward: Kwakupa
Case description: Untrained sanitation providers

Quotations:

P 3: paired fundi interview.txt - 3:19 (155:159) (Super)Codes: [labour cost]

Fundi 2: The costs depend on the agreement between the customer and the fundi, we charge taking into account the economic level of the customer. Where we live, we are all poor, but we live like relatives. How you know each other is very important when trying to come up with a figure, e.g. TZS 100,000, or 80,000, therefore if a customer is poor, there is no reason to run away from him, he/she wants a latrine, as a fundi, you have to assist that person. The TZS100,000 covers only the lining and covering of the pit, superstructure has another charge so you have to make a different agreement for that. It costs about TZS15,000 for the superstructure. With that, we did the lining and covering, that was the end, likewise for the third, we did not build the wall. The charges were TZS 100,000 and 80,000 respectively. The pits were 11ft deep.

Case 4
Municipality: Ilala
Ward: Mtakuja
Case description: Untrained sanitation providers

Quotations:

P 4: fundis vingunguti.txt - 4:42 (847:847) (Super)Codes: [labour cost]

Fundi 4: You look at the client and know what to charge. You can decide to charge Tzsh150,000.

Fundi 2: It can even go up to one hundred thousand shillings for a pit latrine. Some might be in a good financial position so you can get two hundred thousand shillings (TZS200, 000).

Fundi 1: About eighty thousand shillings (TZS80, 000). For building a latrine, say a latrine this deep will cost how much. If we had the same standard our lives would be better.

Case 5
Municipality: Kinondoni
Ward: Manzese/Tandale
Case description: Untrained sanitation providers

Quotations:

P 9: fundi manzese and tandale(1).txt – 9:59 (638:641) (Super) Codes: [labour cost]

Fundi 1: The first thing is how deep the latrine will be, if it is 7 feet you will see how many bricks will be needed and for 12 feet how many bricks will it take. Yes, you will have to know what depth will take how many bricks and how many bags of cement will be left after building. You must first calculate the cost of materials then you agree on building.

Fundi 2: I will calculate the different things and then quote TZS50,000 to dig the pit, TZS60,000 for lining, and the superstructure will be TZS.40, 000.

Case 6
Municipality: Temeke
Ward: Keko Mwanga A
Case description: Untrained sanitation providers

Quotations:

P10: FUNDIS NO. 7 VETA (2).txt - 10:64 (666:667) (Super) Codes: [labour cost]

Fundi 2: It can start from pit digging to covering up, you can reach up to TZS80,000 – 90,000. It depends on the employer, others can pay up to TZS100,000. Up to the superstructure, it can be TZS180,000 – 200,000. For example for the side of Keko, the highest amount for digging the pit, lining and superstructure can be TZS70,000 – 80,000.

Fundi 4: We builders don't have any deal, we are so many but if the clever ones have not arrived, you can make an agreement of building a latrine for TZS100,000 for digging, building and everything. Another mason can come and ask for only TZS50,000 so it's like that. If there is stability in price, building latrines in Keko can take up to TZS100,000 - TZS120,000.

TRAINED SANITATION PROVIDERS

Case 7
Municipality: Temeke
Ward: Keko Mwanga B
Case description: Trained sanitation providers

Quotations:

P 5: Keko Mwanga Fundi.txt - 5:54 (458:460) (Super) Codes: [labour cost]

M: How do you charge the client so as to get the money that you want?

Fundi 1: You just make an intelligent guess, for example making a pit can be TZS30,000 - 50,000, lining with bricks can be TZS30,000 and covering can be TZS 30,000, etc. The first hardship is that we are always not sure of being paid due to the tendency of Keko clients, I do not know if the problem is the number of the masons in this small area. The masons have no rights to remind the clients of the debts. That's a normal game in Keko Mwanga. When making agreements, we consider getting a job first because we are so many, so when a client asks on the building cost, you start trembling because if you give out a high price/cost, he will go to somebody else and get the service for the lower cost, so you have to agree for the same payment. The client will start telling you, I know you well, you built so and so a latrine up to here you will have to reduce the payment cost. You can start with TZS40,000 but you will come down to TZS 30,000. Poverty among the builders; so they start with TZS50,000 and this is due to the large number of builders found in Keko.

Fundi 2: It depends on the type of latrine. For example; pit latrines cost TZS50,000; chamber (off-set flush) latrines costs TZS90,000 – 100,000. They do not have a specific price and there is no guarantee on the price.

Fundi 3: It depend on the ability of the latrine owner, a pit will latrine lined with bricks will cost about TZS40,000 - 60,000. I am paid TZS80,000 if they are flushing latrines and TZS5,000 - 6,000 for a drum latrine. Yes, the total price of a an off-set flush latrine for example is about TZS300,000, the builder's payment/cost is TZS100,000 to 130,000.

Fundi 4: For costing a latrine, the builder will consider pit digging, lining with bricks and at last in the covering process (platform construction). My assistants and I do work humanly. I do not consider that I'm working but I consider the money I get. If it's fine, I give him a good pay, if it's not, then I pay him a small amount of money. I normally pay my assistant TZS2,000 per day. I agree the cost depending on my relationship with the client. If he is my relative and it is a 12 feet latrine, my building cost is TZS50,000. He will provide 300 bricks and 10 bags of cement. We will use 6 bags for building the lower part, as it has different measurement. We do 28 to 30 bricks per bag in the squatter areas.

Case	8
Municipality:	Temeke
Ward:	Keko Magurumbasi (ZamCargo)
Case description:	Trained sanitation providers

Quotations:

P 8: fundi's keko Veta(1).txt - 8:79 (930:930) (Super) Codes: [labour cost]

Fundi 1: I consider how long it will take me to do that work, if it is a week you add another week so that is fourteen days, so that's where your agreement will be. You also make an allowance of days and how much you will pay the assistant, you then add up everything to get the cost.

Fundi 2: The time is not so important but you look at the number of bricks. There is a difference between the brick for building a latrine and a house. Basically you look at the materials because the client might stop the work so time is not so important.

Fundi 8: TZS7,000 per day would be fair, but average is from TZS3,000 – 5,000.

Fundi 4: There is an average prices/cost and if there are two fundis they start with thirty thousand shillings. It has gone up to fifty thousand now.

Fundi 9: Recently about two weeks ago, I built a pit latrine for my neighbour, but for his calculations for digging a pit, a mason and I cost TZS354,000 and it was completed.

Key points:

- There are no standard costs for the various latrine technology and options. It depends on the relationship between the SIPS and the house owner and on the ability of SIPS to negotiate.
- Other deciding factors include the soil condition, population of builders operating in a particular area and the perceived financial status of the house owner.
- Small independent providers only quote for the labour cost up to the substructure, the superstructure is costed separately.
- The cost of digging an average pit of 12ft ranges from TZH30,000 – 60,000 depending on the soil condition; lining and platform costs between TZS40,000 – 100,000 depending on the depth.
- Although drum latrines are the cheapest and least acceptable option, latrine builders consider this option a waste of money because they are temporary and do not last for long.
- All construction materials are provided by the house owner and are therefore not included in the costing by SIPS.

5.9 Technical difficulties encountered by SIPS

Box 22: Case histories: Technical difficulties encountered by SIPS

UNTRAINED SANITATION PROVIDERS

Case 1
Municipality: Ilala
Ward: Kombo
Case description: Untrained sanitation providers

Quotations:

P 1: Dummy fundis.txt - 1:43 (295:299) Super)Codes:[constdiff]

Fundi 1; Problems are there, for example caving in of pits. This happens with sandy soils. It is a problem digging a pit in sandy soil. There you will have to dig again, because the customer is not responsible for that, so he pays nothing for that course because the contract had already been made. You just keep your fingers crossed that there would be no caving in. there is no way the pit can be prevented from caving in.

Case 2
Municipality: Temeke
Ward: Mamboleo B
Case description: Untrained sanitation providers

Quotations:

P 2: Maboleo b untrained.txt - 2:5 (43:51) (Super)Codes: [constdiff]

Fundi 1; Most parts of Dar-es-Salaam city are sandy, the main problem is that the water table is very high. You just dig a little and you have water, or you dig, take out the water and build. This means that after digging your latrine in Dar, you must line it from the base ground to the top. At the top you have to cover either with concrete or if you are putting 'mikoko' (mangrove) and then arrange your blocks and pour concrete. You may also cover it with timber, tie with bars and pour concrete. But you would find that the pit is full even before it is put to use.

Fundi 2; In the early months there would still be a lot of water in the ground, therefore as much as you dig, you cannot get far, you will be troubled a lot. At the same time you may find that the owner does not have the capacity to control the situation, he may be having just a little money. You can try to educate him, but he will tell you I don't have that amount of money so just do it so that I get a facility to relieve myself. You can suggest that he waits till September or October for the water level to go down but he would say, 'where shall I be going, waiting is impossible.' At that point it is for you and the owner to discuss and agree. That is why you find many problems with the latrines in Dar-es-salaam. As if this is not enough, the space available is very small. You can find a person with an area of 40ft and would like to have a house and a latrine at the same place, therefore working in a pit latrine in such an area is very difficult. Houses are so close together that you cannot have a standard latrine, it is not easy. With this closeness of houses, the water has nowhere to go in the ground, therefore you find that everywhere you dig, the water will flow there,

and you therefore experience frequent problems in areas of this kind.

Fundi-5: I have experienced two problems, 1st I fell into a pit 12ft deep, this happened after I had finished the last two courses of lining. The 2nd happened when I had bent to lay a block, a mass of earth fell over me, half of it was on me, but I jumped to the ladder and was saved. So God saved me by jumping over to the ladder leaving the laid blocks covered with earth.

Fundi-7: The processes are: when the customer comes asking to be built a latrine, you ask him about his location, which area and you will leave together to his place, there you look at the environment. If you find that the environmental condition is difficult, you have to tell him, "you are surrounded by houses, when we dig and go deeper, there is a danger of losses and can be forced to build a new wall." So you sit there and discuss. When you reach an agreement, then a pit digger would be found to dig the pit. He has to make sure the blocks and the rest of the material are ready. When the pit digger comes, you must start lining; you should not leave the pit a single night, you will find that the walls of the neighbours have fallen down in the morning. That's why digging a pit in Uswahilini is very difficult as compared to areas like Mbezi. It happened in Manzese, I dug a 12ft pit, and there were supposed to be 2 pits, 1st the septic and the other the soak pit. When I was setting for the 1st time, a mass of earth covered me but thank God that another fundi was in the pit and removed the earth from me using a spade.

Fundi-4: We were building a latrine in the rainy season, we had lined the pit, we found the pit had collapsed the following morning. It was therefore an extra cost for us since the owner said it was our problem that the pit had collapsed.

Case	3
Municipality:	Ilala
Ward:	Mtakuja
Case description:	Untrained sanitation providers

Quotations

P 4: fundis vingunguti.txt - 4:17 (374:376) (Super) Codes: [constdiff]

Fundi 1: The problem might not be water, you might find that the area where you are digging is close to the wall and you are digging twelve feet, this endangers the wall.

Fundi 2: You could have agreed to have a pit of twelve feet and you have set out to do that in two days. The first day you do eight feet. You are only left with four feet that you will complete the following day. When you come in the morning you find the pit has collapsed. You have to scoop out the soil until you get the eight feet, but instead you get seven feet. When you left yesterday you had dug eight feet and today you do seven. That is a major problem.

Case	4
Municipality:	Kinondoni
Ward:	Manzese/Tandale

Case description: Untrained sanitation providers

Quotations:

P 9: fundi manzese and tandale(1).txt - 9:75 (779:781) (Super) Codes: [constdiff]

Fundi 1: It depends. In some areas you might find some places have clay soil and others are sandy. If it is clay then it is hard and this contributes to poor payment but a sandy place it is easier to collapse so you have to devise a way of preventing this so that you can complete the pit. You probably have dug seven feet; it collapses so you have to dig again. I once dug eight feet and it sunk I scooped the soil and continued but it sunk again. I decide to scoop the soil and dig a little until we completed.

TRAINED SANITATION PROVIDERS

Case 6
Municipality: Temeke
Ward: Keko Mwanga B
Case description: Trained sanitation providers

Quotations

P 5: Keko Mwanga Fundi.txt - 5:67 (684:686) (Super) Codes: [constdiff]

Fundi 1; The common problem is in pit latrines, when digging a pit you can be covered up by the soil that is coming back into the pit. This can break somebody's leg or even kill him

Fundi 2; I came across such problems four times. It happened when I and my assistant were building an 18 feet latrine. I was about to travel so he suggested that we should go faster because there will be no one to give him money for building the latrine in my absence. We built 6 feet in the first day, and we were to finish in the second day but used to put the logs and wood after every 6 feet. We normally had a ladder that we used to get out of the pit. After we arranged the stones and bricks, they all came back and covered up my assistant and unfortunately our site was too far (Temeke Mwisho). So what I did was to keep silence as shouting do not help, and as it was evening time. I started removing the stones and bricks one after another, and I told him not to contract, just to relax so as to breathe easily. I removed so many bricks almost a lorry, after that I asked him to straighten himself up. The next event happened was in Keko Mwanga 'B'. I was covered up to my shoulders only my head was seen. The first important thing here is to help your fellow and not to shout. Try to help him because once you shout he will know that he is going to die so he will be shocked and probably die. Or if you shout, you will attract women who will shout or even cry, which can contribute in reducing your strength to save the victim.

The third problem arises when the client shows you a place to build a latrine that is not his (a place is not his). When the real owner comes you will be in quarrel and if you do not run for your safety, you will be beaten.

Fundi 3: Because of very soft sand and the second problem arises because large areas of Keko Mwanga 'B' are old cemeteries. Most people are bought land that was an old cemetery

unknowingly, so when the mason is asked to dig in a certain place; we always dig out human skulls.

Fundi 4: In Keko Mwanga, there is a place that is so swampy. It is a way to Keko Machungwa.

Keko Mwanga itself is just like an island, you cannot go 12 feet to 18 feet without coming across some water, and water is always seen after digging 4-5 feet.

Case 7
Municipality: Ilala
Ward: Buguruni/Vinvinguti/Mbagala
Case description: Trained sanitation providers

Quotations:

P 7: trainednot supported(1).txt - 7:4 (50:52) (Super) Codes: [constdiff]

Fundi 6: We live in areas of two categories, valleys and flat landscapes. Valleys are dangerous when it comes to building latrines especially during rainy season. When you dig 1ft, water fills up the pit. Pits often collapse during the digging. You build one course at a time, you stop, then another, until you finish. It is from experience. In other areas, houses are very congested. You can dig a pit at a point where they have already dug more than 10 pits; there is therefore a danger of other people's houses falling.

Fundi 3: Perhaps to add on the question of building latrines: A customer can buy materials, and it reaches a time when the materials are exhausted and he would stay a long time before he buys some more. By the time he buys material for the second time, the costs would have risen which means the latrine charges you agreed earlier will be valueless. This also has been a problem. It is easier for us if the materials are provided as required and timely and the work would be finished on time. For example, a pit can be dug and lined but not completed because of shortage of materials. The owner stays for four or five months, the pit will fill up with earth etc. When you are told to go and continue work you find there is extra work because you have to clear the pit of foreign matter so you will have to pay helpers not at the old labour charges but new ones, this is a problem.

Box 23: Case history- Relationship with house owners and payment difficulties

UNTRAINED SANITATION PROVIDERS

Case 1
Municipality: Ilala
Ward: Kombo
Case description: Untrained sanitation providers

Quotations:

P 1: Dummy fundis.txt - 1:47 (334:336) (Super) Codes: [Hhrelation]

Fundi: Yes, we do abandon latrine construction with low payment and we go for one with high pay. But again, this has got to do with trust; some of us are so greedy.

Case 2
Municipality: Temeke
Ward: Mamboleo B
Case description: Untrained sanitation providers

Quotations:

P 2: Maboleo b untrained.txt - 2:124 (993:996) (Super) Codes: [Hhrelation]

Fundi-10: There are problems like, you may start work for TZS100,000, then the owner during the course of the work will say he bought more materials than is needed, so your pay will be reduced. In this instance, he can insist that he will give you TZS80,000 rather than the agreed TZS100,000, so in this case problems may arise. These problems arise so much because of the owners not sticking to the agreements made in the first meeting.

Fundi-7: The important thing is for the customer to first prove that the fundi is not a fake. Owners these days go for something that is cheap because real fundis charge high rates and in the process they will get fake fundis and when they run away from the job, all fundis are blamed.

Case 3
Municipality: Kinondoni
Ward: Manzese/Tandale
Case description: Untrained sanitation providers

Quotations:

P 9: fundi manzese and tandale(1).txt - 9:65 (686:688) (Super) Codes:[Hhrelation] [payment problems]

Fundi 3: Yes you do have problems with the availability of materials. You might work to a certain point (middle) then you run out of cement and when you request for it he doesn't bring it so you have to wait. Meanwhile, you have already used up the money that he gave you as advance payment. So waiting for materials is a problem and it might take long.

Fundi 4: It depends on the customer and how fast he is in providing materials; if he has them then it will be smooth, if he does not, it will be hard. The fundi gets angry for being late because he wants to complete and move on to another one. If he has not finished and moves to another work the customer will press charges.

TRAINED SANITATION PROVIDERS

Case 4
Municipality: Temeke
Ward: Keko Mwanga B
Case description: Trained sanitation providers

Quotations:

P 5: Keko Mwanga Fundi.txt - 5:70 (737:742) (Super) Codes: [Hhrelation]

Fundi 1: They are the same for example you can be assigned to do a certain job by the client, and later on the client can turn on you. He can say that you wanted to steal his properties only to deny your right to be paid for the job.

Fundi 3: I got a job of putting tiles; we agreed that I was going to put one tile for a certain amount of money. After calculating the total amount to be paid, the client started claiming that you have stolen tins of paint. It is only because you have given him the cost that he never expected so he is just trying to deny your right to be paid.

Fundi 3: If you ask for an advance payment on the first day of starting the job, you will be told to wait till the end of the day, and in the evening if you asked for 10,000 - 15,000 you will be told to take 8,000. If it happens that you are given 15,000 you will not be paid at the end of the whole job. After you have completed the job, the client can say that he doesn't have the remaining amount for that time, he will promise to pay sometime later. That's a normal game in Keko.

Case 5
Municipality: Ilala
Ward: Buguruni/Vinvinguti/Mbagala
Case description: Trained sanitation providers

Quotations:

P 7: trainednot supported(1).txt - 7:133 (958:961) (Super) Codes: [Hhrelation]

Fundi 2: This is a misconception of the matter. Fundis are reputed to be problematic and customers are regarded to be non-problematic but the fact is they are problematic. For a customer to go after a fundi for unfinished business it is fine, but for a fundi to pursue the customer for his money, the customer would start avoiding or running away from you.

5.10 House owners' knowledge and preferences for latrines

Box 24: Case histories - Knowledge & awareness of latrine options amongst households

Case 1
Description: mixed landlords/landladies with improved latrine

Notes:

P 6: *FGD mixed landlords improved latrine.txt - 6:149 (152:166) (Super) Codes: [knowledge]*

R 2: The latrines that I know are same as those that have been mentioned by others. For instance drum and tyre latrine, sometimes the pit fills up and overflows, when it rains faeces flow out to the road and if you tell the owners they become very aggressive.

R 3: The difference is for the drum latrine when the drum gets full it becomes useless so the user have to leave it. After some time (2-3 years), the drums begin to rust and leak and when it rains sewage flows out to the open with the storm water. But for the tyre latrine, when it is full, they will wait for the contents to subside and then build another latrine using the same tyres, tyres never decay. If it is full and not subsided, they still have to find another place to defecate and once the latrine contents have subsided, they take the tyres and build another latrine. For the drums when they are rusted, you can build in the same place

Case 2
Description: mixed landlords/landladies with improved latrine

Notes:

P 8: *mixedlandlordimproved latrine.txt - 8:10 (126:129) (Super) Codes: [knowledge]*

R 1: There are three types of latrines that we know. The flush latrines that we sit on which are normally found in urban areas in better houses. The other type, is the one a person squats on, they are called Indian type. Ours are pit latrines that we use in our homes, they are common to the people of Keko Mwanga, and we know them very well.

R 2: We just dig pits and it's covered, the fundi puts on bricks and when he is through with putting in the bricks, then it's ready for use. With this type, when you are taking a bath, a person outside cannot see your stomach. You can chat with your neighbour while you are taking a bath. This we call passport latrines.

R 3: The type that has not been mentioned is that lined with drums because they are the ones that we have here. We also have those made from car tyres. These, just like those made from drums, require digging a pit first of all, then you put the drums inside and then you can use timber covered with mud as the platform part and it's ready for use. For the one made of tyres, one digs a pit, and then puts used tyres inside by arranging them in order, covers the top part and it's ready for use.

R 4: Oh yes. The ikolojia one is a bit different. One does not need to dig a different pit at the side for draining sewage water from the latrine. What you do is just channel a pipe to container to collect the urine so that it does not mix with the faeces.

R 5: On my side, I saw most of them in the rural areas and some of them here. Latrines in rural areas are different from those in urban areas. Those in rural areas are smaller than the ones we have here in town. In town apart from pit latrines, we now have sophisticated flush latrines that one squats on, that do not have bad smell, and once one flushes the latrine, the dirt disappears to where we do not know.

Case 3

Description: landladies living with tenants and with unimproved latrines

Notes:

P12: Landladies with tenants -unimproved latrine.(Super) Codes: [knowledge]

R 2: I think what my fellow said is true; in those days people were using latrine built of large baskets. Those latrines made of baskets and tyres are not safe and they smell. When you enter inside you will understand that this latrine is made of tyres or basket. But if you build block latrines well using wood and concrete, with a superstructure, which is not too high but not too short that you can be seen inside, it is very helpful. The problem is the cost, you find you use 200,000/= only for the substructure, what about the rest, that is why we said once you win bingo the first thing to do is to build the latrine. You can build a good latrine, paint it, and when somebody sees it they will say that Mwakanyamale have a good latrine. This latrine that I am talking about, even you Meki once you come to visit and ask to use a latrine I will not be worried, but for now I would say go but be careful, it is bad.

R 3: For the drum latrines, they dig a pit, and then arrange drums from the bottom. They cut the drum to make the opening at the bottom and top, but the last drum is not cut and is covered with sand.

R 4: There is one place, I went to look at latrines and actually they came to take us. Those latrines have two sides, one for urinating and the other for defecating. There is also a place for hand washing and all the water goes separately to a container outside. There are alternate vaults for the faeces to allow for continuous use when one side fills up.

R 5: I know about the ecosan and in Keko Mwanga we have one built near to Hon. Sharifu, they told us that it is cheap. In our case it is good because there is no need to dig a pit, as you just build above ground until you reach the height of table with trap doors at the back of the vault.

Box 25: Field insight - House owners' perceptions of latrines

Case 1

Description: Landladies Keko Mwanga and ZamCargo with mixed latrines

Notes:

R 1: I have a pit latrine and it is two years old but it has problems from bottom to the top, last Sunday it broke. First it was a loss because it didn't even last for two years. Secondly it was a nuisance because if you wanted to bath you had to go to the neighbours even to use the latrine. Fortunately or unfortunately I didn't get a visitor during this time asking to use my latrine. I would have had to take him/her to my neighbour.

Case 2

Description: landlords from Keko Mwanga and ZamCargo with mixed latrines

Notes:

P 4: landlords Keko veta.txt - 4:11 (99:99) (Super) Codes: [Brick]

R 2: I have a brick one but it is old. The floor was too light so after using it for a while it started cracking; I had to buy another bag of cement to rectify it.

R 3: I have a round one that is eleven feet deep, on top I have put a sink that is covered that I use for flushing.

R 4: I started with a bin latrine but it was almost full. Later when the ecosan was introduced the sponsors told us that as a community we could raise a certain amount of money, so I registered myself. But my latrine got full before the sponsor came so I got my materials as I already knew what was needed, I started collecting them. I told an expert but the sponsor didn't have the money so I asked a fundi to build one for me and asked him to wait for the sponsors to give the money and he agreed so we started building. I assisted him to completion.

Case 3

Description: Landlords from Manzese and Tandale with mixed latrines

Notes:

P 5: landlords manzese.txt - 5:88 (611:613) (Super) Codes: [Latrine super structure]

I have a brick latrine, I built the structure but I was short of funds to put a roof though I had iron sheets, which were later stolen. I had to put sacks because I didn't have the financial ability. I have had the sacks for a long time.

Case 4

Description: mixed landlords/landladies with improved latrine

Notes:

P 8: mixedlandlordimproved latrine (Super) Codes: [Brick] [Latrine super structure]

R 1: Mine is a pit latrine of 12ft deep with brick walls half made and without a door. It is not necessary for it to have a door so that in case my neighbour needs to use it at night they can just go ahead and use it. Like I told you, when you are taking a bath in my latrine, someone outside can see half of your body as only the part up to the waist is hidden by the half-made wall. So the type of latrine that I have is the one from which you can say hello to your neighbour while taking a shower.

R3: About two and a half years and it's in good standard but it's not like the modern ones. It's just the old type built in a modern way though it does not have an iron roof.

R4: To start with, I might say that what seems important is having the pit in place, covering the sides, which we call passport size as they have no roofs, and that's all. I think this is just a mentality that has grown in people's mind that once those things are in place; there is no need of having a door. But I personally don't see why one should not complete the latrine.

Case 5

Description: Tenants in houses with absentee landlord and with unimproved latrines

Notes:

P 9: Tenants without landlords(2) (358:361) (Super) Codes: [Latrine quality]

R: My latrine is a pit latrine as she said; it is divided into 2, for those who are living inside the house and others who are living out of the house. It is a small tight place that we call passport size, when you are taking a bath, you have to put your clothes at the door so that your neighbours will know that that there is somebody in the bathroom. I have been living there about 10-15 years, one day I was taking a bath and the wall and iron sheet fell down.

Case 6

Description: landlords with unimproved latrines

Notes:

P10: landlords with unimproved latrine (632:633) (Super) Codes: [Dissatisfaction with latrine]

R 2: I do not like the superstructure because it is just made of old tins and plastic materials you can be seen from the outside.

R 3: I am not happy with my latrine but money is a problem. I would like to separate it into two rooms, one for bathing and another for defecating.

Box 26: Case history – House owners' motivations for installing latrines

Case 1

Description: Landladies Keko Mwanga and ZamCargo with mixed latrines

Notes:

P 1: Landladies with mixed latrines. txt - 1:49 (210:212) (Super) Codes: [Motivation]

R 2: I did. It got full to the brim that it overflowed and I had to use my neighbour's. I decided I couldn't use the neighbour's latrine forever so I got a fundi to build one.

R 3: I have had the house since my mother died and my father moved to Arusha. Since I am the oldest and I am a leader in the environment committee and my latrine was in a bad shape I decided to build one.

Case 2

Description: Landlords from Keko Mwanga and ZamCargo with mixed latrines

Notes:

P 4: landlords mixed latrines (Super) Codes: [Decision making] [Motivation]

R 1: As the landlord you should put a latrine because you cannot put up a house without a latrine. There would be health problems like cholera if there was no latrine, so for this reason you should have a good latrine and a bathroom.

R 2: If you want to put a house then you must think of putting a latrine too. If you don't, it would be like putting up a house without roof. So it would be pointless to have a house without a latrine.

R 3: For a sane human being, when you think about building a house you must also think about the latrine. It is the most important thing and probably the first thing that you think about. You should give it a priority. Then you look for a fundi and check on the cost and come to an agreement. As one of the participants said it is very important and it is a priority

R 4: I was and I also wanted it in a hurry because we didn't have one to use we had to go to our neighbour.

Case 3

Description: landlords from Manzese and Tandale with mixed latrines

Notes:

P 5: landlords manzese.txt - 5:23 (197:198) (Super) Codes: [Motivation]

R 1: If a tenant comes to view the house, the first thing he asks for is the latrine and then he asks for the room, electricity and water.

R 2: The latrine issue is more important than anything else, you might build a complete house without the inner doors, you agree with your wife to put a sack on the doors and then you use the

money remaining to build a latrine.

R 3: As we said a house without a latrine is not a house. When you go to relieve yourself you take a bucket of water with you so that when you are done you have to shower because it stinks. If the latrine is clean then there is no problem you just agree on the price with the tenant.

Case 4

Description: mixed landlords/landladies with improved latrine

Notes:

P 6: *FGD mixed landlords improved latrine.txt - 6:154 (320:324) (Super) Codes: [Motivation]*

R 1: Things which pushed me to build a permanent latrine is because of the place I'm living. I am living with other people so you have to cope with how others live. Your colleagues are building permanent latrines you have also to build one so as not to provoke your neighbours often.

R 3: Latrine is extremely important for human life, because even if you build a good and well painted house if it has no latrine that is not a house at all. There is nobody who will come and stay there if there is no latrine. A human being is required to live in a nice place and a latrine is what protects our humanity/dignity because it's a latrine which can store our faeces.

Case 5

Description: mixed landlords/landladies with improved latrine

Notes:

P 8: *mixedlandlordimproved latrine.txt - 8:24 (234:236) (Super) Codes: [Motivation]*

R 2: The benefit is having a safe place or good environment that is easy for you to use. You do not answer calls of nature in public; you need to have a private place. That is the benefit of having a latrine.

R 3: The benefit of having a latrine is great and that's why we say a house is incomplete without a latrine. That is we can't call a house without a latrine a house. It's incomplete because it did not put into consideration the issue of health. Without a latrine one should expect disease outbreaks such as cholera which is caused by faeces. When flies come out of the latrine and land on food, they cause diseases so a latrine that is safe is so important.

R 4: A bad latrine creates sickness in the homes there forcing people to spend their already tight budget to treat the sick. Lives can also be lost through these outbreaks. So these are the major disadvantages of not having a good latrine.

R 5: Sure, there are disadvantages because if you do not have a latrine, using your neighbours is not good as it becomes full within a short time. Secondly by the time you want to use your neighbours' latrine, you might find another person using it and so you have to wait until the person

comes out, you are not able to use the latrine.

R 7: I think there would be a lot of difficulties. Once you feel like going to the latrine be it for a long or short call, the first thing that comes to your mind is thinking of a place to go to. This is a psychological torture in one way or another. What this colleague has just said is very true. You don't have a latrine while others have. When you have the urge to go to the latrine, sometimes one can delay but there are instances when it becomes impossible, like when one has diarrhoea, one can even do it in the house.

Box 27: Case history - Barriers to installing improved household latrines

Case 1
Description: landladies Keko Mwanga and ZamCargo with mixed latrines

Notes:

P 1: LANDLADIES.txt - 1:39 (167:169) (Super) Codes: [Emptying difficulty]

R 4: I looked at my neighbours' and saw that I could not afford to put up one like that because they are rich but some of them are low-class. I looked at these and those who had good latrines so I built one that I could afford.

Case 2
Description: landlords form Keko Mwanga and ZamCargo with mixed latrines

Notes:

P 4: landlords Keko veta.txt - 4:32 (200:202) (Super) Codes: [No latrine?]

R 1: This would be because of the cost; one would have to dig up a pit that is twelve feet deep, buy cement, bricks to fit into twelve feet, timber and building rods etc that is why some opt to make tyre latrines.

Case 3
Description: mixed landlords/landladies with improved latrine

Notes:

P 6: FGD mixed landlords improved latrine.txt - 6:52 (443:446) (Super)

R 1: In short, to get information on the type and style of latrine to build, you have to do it yourself, in your head you have to learn because there is nowhere to go. Let's say in Keko area you can find some people built a latrine but it was damaged after two years, you will learn from their experience whether the damage was due to the quality of blocks, roof or cement.

R 3: Other things which we consider in our latrines are maintenance because other people

especially women who have young children throw faeces in the pit with sand. If today she takes a quarter (of sand) and tomorrow a quarter after eight days you have a kilogram of sand thrown into the pit. Now in one house you might have 6 rooms with 6 different households and they have children, so one times four is how much? Thus the load increases, apart from the faeces you also have the load of old clothes, today one piece and tomorrow one piece of old cloth, small items used by kids. It's all about caring and maintenance, this is very basic. But if you tell the women not to throw children's faeces with sand, they will tell you that you are humiliating them, but when the pit gets full she will go and I am the one who suffers.

Case 4

Description: tenants in houses with absentee landlord and with unimproved latrines

Notes:

R 1: Yes! Because there is no respect between us, when we arrange to do cleaning, some refuse to participate fully, that is only the problem. The problem is when others refuse to do the cleaning especially when neighbours come and use the same latrine, if you ask them why they left their latrine, it is because it is not strong or unclean, others create problem, why? Our latrine!! Anyway cleaning must continue in spite of the problems.

Case 6

Description: landladies living with tenants and with unimproved latrines

Notes:

P12: landladies with tenants -unimproved latrine (Super) Codes: [Latrine info source]

R 1: For those who have tenants in their houses, it's quite impossible to monitor them because sometimes you are sleeping they take the advantage to drop something in the pit. Even if you make a small hole, they will try to force anything to pass through. For example, in my first latrine when we emptied it, we found so many wonderful and amazing things inside and we not sure how these things were put inside. I realized that to make a big hole it's like you are creating problems, because people will take that as an advantage. So what I learnt is to make small holes, you can find inside the latrine something like a cup, spoon etc. One of my neighbours found a mattress inside his latrine, you can't believe it. You cannot imagine that somebody can throw this inside. Our latrine is not located in a safe way it's just open, everybody can do what they like. For the owner you can't do something like that, but people we live with have their own behaviour. Others they don't care about health and when you continue to insist on health, they say you are harassing them, they can take more rubbish and put in front of your door.

5.11 House owners' experiences of acquiring sanitation services

Box 28: Field insight - Finding small independent latrine builders

Case 1

Description: landladies Keko Mwanga and ZamCargo with mixed latrines

Notes:

P 1: Landladies.txt - 1:35 (156:157) (Super) Codes: [Locating SIPS]

R 1: I asked around for one that could do everything from the digging to the final stage. I was told my neighbour used the same fundi.

R 2: I saw his work so I looked for him. I knew the young man because he was building my neighbour's house.

Case 2

Description: landlords from Keko Mwanga and ZamCargo with mixed latrines

Notes:

P 4: landlords Keko veta.txt - 4:39 (226:227) (Super) Codes:

R 2: As I went about my business I bumped into him and asked him to see me after he was done.

R 3: I needed to get an expert because I have an ecosan latrine. I got through a workshop with the other people chosen from Zamcargo. I got one who was an expert in this type of latrine. There was a demonstration in order to make us more aware.

Key points:

- There are no designated places for locating small independent sanitation providers.
- Most house owners in need of a latrine often get recommendations for latrine builders from neighbours, friend and relatives.
- SIPS are also identified while building latrines for other people.
- The lack of specific locations or organizations for SIPS results in lack of accountability, trust and point of contact in case of problems after latrine installation. The experiences of households with SIPS are discussed in the next section.

Box 29: Case history - House owners experiences with SIPS

Case 1

Description: Landladies with mixed latrines (improved and unimproved)

Notes:

P 1: LANDLADIES.txt - 1:48 (204:208) (Super) Codes: [Experience with SIPS]

R 1: He disturbed me a lot. He was not trustworthy; he would say he has run low on some materials. He would use a quarter of a bag of cement and he would not give you the remainder.

R 2: I met the fundi and told him that I wanted a latrine and asked how much it would cost me; he asked if it was from the beginning to the completion. I told him that it was not full so he was just going to do the top. We agreed on forty-five thousand and I told him it was a bit high. We haggled until he agreed to take thirty-five thousand. He asked for an advance as he had to look for assistance. I told him I would pay him, but the following day he asked me for money to buy food which I did and the following day he came with his colleague and I had to buy timber. Some people passed by and advised that if I wanted it to last long I had to empty so even if it was not full, this was going to be another expense and I was in hurry. He finished apart from plastering. Since the latrine is also used for bathing, I had to use a whole bag of cement and I had to buy some more. I didn't have a supervisor so I just handed him the materials and when I asked for the remainder, it was one story after another so I let it go. I did, I trusted the fundi so I didn't have a supervisor and that's where things went wrong.

R 3: Personally the fundi loved money so I didn't pay him in full. I would pay him as he worked and completed a stage. Sometimes I would give him money and he doesn't show up the following day. You might give him the whole amount and he disappears. Yes, although he had two assistants. I would pay him but he wouldn't pay his assistants as they had agreed so they would not work well.

R4: I assisted the fundi from the beginning to the end. There were problems because the fundi was not paying his assistants well. They would not show up the following day. I was in a hurry so I would do the mixing and take to him.

Case 2

Description: Landladies with mixed latrines (improved and unimproved)

Notes:

P 3: landladies vingunguti.txt - 3:7 (75:77) (Super) Codes: [Experience with SIPS]

R 3: I have a different opinion. Some fundis when you send them to buy cement they will and also build well without spoiling anything. There are fundis who are like that.

R 4: Yes, he said that when my latrine is complete I would have to give him three hundred thousand shillings (Tsh.300, 000). I asked him to reduce the amount for me because of my

situation. He told me that he would stop when I stopped paying. He was not serious because he built up to a point and stopped. He didn't put the stairs and he has not roofed. He wants more money and I don't have and I am still laying the bricks. I have done everything else including plastering but I have not finished. I laid the bricks for the entrance because he wants me to pay and yet I don't know where to get the money for paying him.

R 7: One part of the pit had water. The fundi dug eight feet and told me that it was 10ft so I told him we had to measure it. He asked what he was going to measure while the ladder was immersed halfway in water. The ladder was ten feet, it sunk but I told him to measure anyway so that I can confirm it was ten feet. It was eight feet instead of ten. He complained that he couldn't dig because it had water. I told him that he should have told me that there was water instead of lying that it was 10ft. I told him I wanted ten feet so they had to dig and drained the water until it was 10ft.

R 8: I had problems with the digging of the pit like this lady here said. If you want a 12ft latrine they dig 10. The fundis are very cunning so you have to be bright and ask them to measure, if you see him getting worried then he is lying. Why do they do a shoddy job if it is women who are the customers? They tell you that they used the ladder to measure and you don't know how long the ladder is and if he says the ladder is halfway immersed in water and you agree. But if you ask him to measure, he gets worried and will instead say that he will dig more. So that's the big problems when it comes to digging.

Case 3

Description: Landlords with mixed latrines (improved and unimproved)

Notes:

P 4: *landlords Keko veta.txt - 4:61 (366:368) (Super) Codes: [Experience with SIPS]*

R 4 I don't want to praise myself but mine is an average one. My neighbour's latrine is not good and it is not safe, I think this is because of using the mafundis in the street. If you get a cheap fundi the work he will do will not be up to standard. We are grateful that now in our area there is a place where they train mafundis to install latrines.

Case 4

Description: Mixed landlords/landladies with improved latrines

Notes

P 5: *landlords manzese.txt - 5:36 (305:308) (Super) Codes: [Experience with SIPS]*

R 1: The major problem is that most mafundi are not trustworthy. There is a fundi I gave money and he ran off with it. Another problem was in the materials, the bricks were mixed with a lot of sand and less cement so they were of low standard so they just crumble.

R 2: The annoying thing is that I started the latrine last year. The first fundi worked and then

claimed that he had finished and left with my money. That was the end of our transaction and he left. We had agreed that he was going to do the whole job including the structure and then we will sort out any other issue that arises. He came with an assistant and then asked me to raise the money and that wasn't the agreement. Yes that is what we had agreed; he was going to put the structure but not the roofing. He didn't have money so I looked for money and gave him but he never finished the work. I found another fundi who also disappeared without roofing and installing the door.

Box 30: Field insight - Costs of installing latrines

Case 1

Description: Landladies with mixed latrines (improved and unimproved)

Notes:

P 3: landladies vingunguti.txt - 3:37 (225:230) (Super) Codes: [latrine cost]

R3: In my case, he first saw the space and then we agree on the pit because it is different from the super structure. He does not offload so if the bricks are out of reach, you have to get someone else to offload or use the ones that are ready. When he comes to dig and the bricks are ready, he builds, puts up the structure and then he roofs. Roofing is also a separate cost. You have a daily agreement until he completes.

R 4: We talked about his expenses, bricks, sand, water, the pit and he said that I should give him TZS300, 000 up to completion. This cost covers digging, logs, platform and all the way until the plastering.

R 5: I bought bricks, ballast, and cement. I don't have the total figure. The cost of the platform and doing the superstructure halfway was TZS170, 000.

Case 2

Description: Landlords with mixed latrines (improved and unimproved)

Notes:

P 4: landlords Keko veta.txt - 4:33 (205:209) (Super) Codes: [latrine cost]

R 1: It cost me TZS.250, 000.

R 2: It cost me TZS.160, 000.

R 3: I used TZS.100, 000 and that was in 1989.

R 4: I used TZS.120, 000.

R 5: If you want to make any improvements on your existing latrine, you have to call a fundi, but the costs have gone up, the fundis cost more and also the materials. I built mine in 1990 and it cost me TZS.95, 000.

R 6: It cost me TZS.170, 000 inclusive of the cement. It was in 1993 we would buy sand and also use the same one that was being dug out.

R 8: My ecosan latrine cost me three hundred thousand shillings

Case 3

Description: Mixed landlords/landladies with improved latrines

Notes:

P 5: *landlords manzese.txt - 5:33 (291:292) (Super) Codes: [latrine cost]*

R 1: You buy the bricks at TZS.300 per brick and transporting so it will cost TZS.100, 000. The fundi asked for TZS.35, 000.

R 2: It cost me three hundred thousand (TZS.300, 000) and it was built in March.

R3: It was about two hundred and fifty thousand shillings (TZS.250, 000).

R 4: Two hundred and sixty thousand shillings (TZS.260, 000).

R 5: It cost me three hundred and fifty thousand shillings. (TZS.350, 000)

R 6: It cost me four hundred thousand shillings (TZS.400, 000).

R 7: I have used three hundred thousand because I need a latrine in a hurry. The superstructure is incomplete and I think it will cost me about one hundred and fifty thousand shillings (TZS.150, 000) to complete everything.

Case 4

Description: mixed landlords improved latrine

Notes:

P 8: *mixedlandlordimproved latrine.txt - 8:36 (497:507) (Super) Codes: [latrine cost]*

R 2: First, I used TZS160,000/ to complete it then I repaired it with 40,000, which brings the total to TZS200,000.

Box 31: Field insight - Payment systems

Case 1

Description: Landladies with mixed latrines (improved and unimproved)

Notes:

P 3: *landladies vingunguti.txt - 3:68 (376:380) (Super) Codes: [Payment]*

R 2: We came to an agreement, he asked for an advance of TZS20,000, I think I gave him in three instalments, they finished their job and I paid them the balance.

R 5: We agreed and I showed him the area. He said that he would start the following day. He started and worked hard. He would stop for lunch and then continue. As usual our houses in the valleys fill with water so when they complete they leave. You give him half the money whatever you had agreed and the following day the same routine. I paid them daily; you pay as he comes to work. If he doesn't show up the work stops and you don't pay him. If he comes on the third or fourth day you know he is around so you are ready. He completed the structure and left because I ran out of money. I struggled until I got used iron sheets and others that I had in the past and I looked for someone else to roof so I have a place to relieve myself.

R 6: In other cases you agree with the fundi that the money that you will pay him is inclusive of lunch where he is working and he meets his own costs. There are others that you agree that you will provide lunch for him. So you have to cook for him until he completes. You meet the lunch expenses. The procedure for payment depends; a fundi might ask you to pay him an advance. If you have agreed Tsh300, 000, you cannot give him the whole amount at a go. You can pay him in two or three instalments. It depends on what he wants or what you want. You might give another one some money and he disappears without finishing your work.

Case 2

Description: Landlords with mixed latrines (improved and unimproved)

Notes:

P 4: *landlords Keko veta.txt - 4:85 (431:432) (Super) Codes: [Payment]*

R 1: We had agreed that I will pay him for the whole thing but I gave him an advance on the first day and the sixth day I paid him the rest.

R 2: We agreed on TZS75,000, when I asked him to start; he told me he would start in the evening. He then asked me to give him TZS10,000. He might ask for money everyday but it is up to you to see if there is any progress and keep a check of how much you have given him. In short you should not pay everything up front, just pay in instalments.

R 3: I paid in two instalments because when I offered them the job they asked me for an advance. Sometimes they ask for 50% advance. For example, if the total cost is TZS200,00 and they ask for 50%, you can give him if you have and also if you trust him. You can pay but it will depend on

whether you trust him, if you are satisfied then you can give him probably after a day.

Case 3

Description: Mixed landlords/landladies with improved latrines

Notes:

P 5: landlords manzese.txt - 5:32 (289:289) (Super) Codes: [Payment]

R 1: We discussed and then I give him a certain amount of money to start working. We agreed on instalments.

R 4: The first fundi and I agreed on a certain fee and then he raised it. I told him that it would take long to pay him and it will have to be instalments. After I told him this, he decided to go with the first agreement and accepted to be paid monthly. By the time he finished I had run out of money. I didn't have money to buy cement and doors but I paid him and I was unable to finish the latrine.

R 5: It took about two months, we had set aside his payment and were paying him in phases until we finished.

Box 32: Field insight - Emptying full pit latrines

Case 1

Description: Landladies with mixed latrines (improved and unimproved)

Notes:

P 1: Landladies.txt - 1:39 (167:169) (Super) Codes: [Emptying difficulty]

R 2: Some are not able, the latrine is full and they cannot empty it, as a fundi will ask for a hundred thousand shillings. (TZS.100, 000). I didn't have any problems but my neighbour died when trying to empty his latrine.

Case 2

Description: Landlords with mixed latrines (improved and unimproved)

Notes:

P 4: landlords Keko veta.txt - 4:125 (665:670) (Super) Codes: [Emptying difficulty]

R 1: I have emptied mine once. When I wanted to empty it I looked for a different fundi known as Jay and he is my neighbour in Keko. He cut out a section of one the rooms and emptied it from there and then he covered it. I was happy with his work. No, it is just people from the estate who can empty it. You can even seal the top then get a fundi to unseal it for you.

Case 3
Description: mixed landlords improved latrine

Notes:

P 6: mixed landlords improved latrine.txt - 6:16 (136:138) (Super) Codes: [Emptying difficulty]

R 2: Thank you very much I can contribute to this topic. All these problems are due to the lack of space and that's why we are affected this much. The unplanned construction, you build your house here and your neighbour builds on the same place. Now your neighbour's latrine is facing your door so when s/he decides to empty his latrine you are not able to eat that day because of bad smell. When he starts emptying might be when you are just about to start eating.

R 3: Prior to emptying the first latrine, we put kerosene to reduce the bad smell. During emptying you have to breakdown the latrine and dig another pit to dispose of the contents, so you have to put kerosene to reduce the bad smell of faeces. It cost me TZS20, 000 to empty my full latrine.

R 4: It cost me Twenty five thousand (TZS25, 000).

R 5: Local pit emptying services is very expensive; you need help from others and your family. Moreover, it is not good healthwise and there is a problem of bad smell.

Case 4
Description: mixed landlords improved latrine

Notes:

P 8: mixedlanlordimproved latrine.txt - 8:48 (543:547) (Super) Codes: [Emptying difficulty]

R 1: I also have thought of having a new latrine as what I have at the moment is of very low standard. I have to dig a different pit at the side from time to time so as to drain the sewage, cover the pit and demolish the outer part that is made of cement and elevate it. I'm thinking of building another latrine at the same cost but when it comes to emptying the pit, how will you do it?

R 2: Like I said before, emptying goes from TZS50, 000 – TZS80, 000 depending on your agreement. Sometimes one does not have cash so one pays in instalments.

R 3: Like I said earlier, we don't have enough space, so what we do is to just dig another pit by the side, demolish the latrine and move the sewage into the new pit. There are special people who do the exercise and they use tools such as buckets and spades. It is these people who construct the latrines for us. Some of them do both jobs, constructing the latrines and emptying them when they are full. When you find an emptying service provider, you bargain whether he would reduce the construction costs or the emptying costs so that you offer him both the jobs, construction and emptying when the latrine is full.

R 4: Because the roads are inaccessible, we have no other way but to use the local means, which

are neither good for health nor the environment. In my opinion this is not proper but it is because of the areas that we live in. For instance there are areas where even a bicycle cannot reach. So when it comes to pit emptying, we just find people with whom you do it together locally. This is not good for health both to people living in the surrounding area and the person who does the job.

R 5: This local pit emptying method that we use is not good for our health, we need to use desludging trucks but the problem is that they cannot reach our places.

Case 5

Description: Landlords with unimproved latrines

Notes:

P10: landlords with unimproved latrine.txt - (581:583) (Super) Codes: [Emptying difficulty]

R 1: To empty a full latrine, they dig another pit adjacent to the old one, make a hole at the old pit and channel the contents into the new pit. When they finish, the parts that have collapsed are reconstructed. I paid TZS 90,000.

R 2: We paid TZS40, 000 to empty our latrine manually. This local emptying method is not good for the health of the masons and for other people because it smells very bad and you cannot eat that day. It is dangerous for human life, even for those doing that job but they need money for survival.

Case 6

Description: Landladies with tenants and um improved latrines

Notes:

P12: Landladies with tenants/unimproved latrine (258:266) (Super) Codes: [Emptying difficulty]

R 1: Some during construction put pipe for letting water out. But for those doing emptying work, they burn tyres or pour kerosene a day before they start emptying. They dug another pit near the latrine and then they burnt tyres to reduce the bad smell before starting to empty. I paid TZS 100,000.

R 5: We paid TZS20, 000. The emptying method is not good, if our area is planned like other place, we would be using those special cars for doing such a job. This method is affecting us. Our health is being affected because of bad smell, those tyres they are burning they pollute the environment.

R 6: It is dangerous for human life, even for those doing that job. We just live with the problems because the condition of our roads does not allow the trucks to do this job, we don't have access for the trucks to pass.

6. Case studies of building SIPS capacity

6.1 Case study 1: Buguruni sanitation workshop

Case study 1: Buguruni sanitation workshop

Background

This project also known as Buguruni kit plant was funded by the World Bank and GTZ and implemented by the Ministry of Water from 1984 – 1996. The objective was to fill the latrine provision gap in low-income settlements in the city of Dar es Salaam. The workshop established under the Environmental Sanitation Unit was headed by a sociologist assisted by sanitary engineers, technicians, masons (4 on long term contract and 10 on temporary basis) and labourers. GTZ funded the initial set up cost while the government funded the running costs including salaries. The key stakeholders in the project were the workshop team (produce and sell components and install latrines); house owners (pay for latrines); City/Municipal Council (facilitate emptying and disposal, and enforce bylaws); Ministry of Water (prepare policies/strategies, latrine designs, and management/provision of subsidies)

Latrine technology options

The main focus of the workshop was on fabricating components of the *Ventilated Improved Pit (VIP)* latrine. The workshop fabricated cement blocks (2", 5" and 6"), latrine slabs, vent pipes, cement/sisal roofing sheets, door frame and water tanks, and also provided building services. The price for a latrine was estimated by the workshop manager and was based on building materials, transportation and labour costs. All the latrine components were sold in the workshop.

Training of masons

The majority of the masons only had primary school education and resided in Ilala Municipality. The masons initially received on the job training at a UNICEF sponsored workshop and later attended specially organised training at the Vocational Training Institute (VETA). No further training was provided for the masons other on the construction of VIP latrines.

Latrine delivery process

Any client in need of a latrine visited the workshop to get information and make full payments up-front for the components, transport, labour and construction supervision costs. Transportation charges were fixed for the first 12 kilometres and beyond this the cost increased. Although the masons on long term contract received a monthly salary, extra output-based allowances were offered based on the number of latrines constructed. This was to encourage masons to market their services and the latrine technology.

Demand generation

Demonstration VIP latrines were constructed at the workshop premises without any form of

promotion or awareness creation for the general public. The management assumed that the demonstration latrines were enough to attract clients and generate demand and uptake of VIP latrines. The lack of sanitation promotion led to very little demand resulting in backlogs of unused latrine components. A workshop to assess project progress identified sanitation promotion as the missing link in scaling up the delivery of latrines by masons in low-income settlements of Dar es Salaam. The project implemented promotion activities by erecting a billboard and transmitting radio messages prepared by the Head of the Environmental Sanitation Unit. As a result of the sanitation promotion activities, especially the radio messages, demand for the VIP latrines and the workshop masons' services increased. The masons provided VIP latrines for institutions officially through the workshop and also privately for house owners at weekends and after office hours both in and outside of Dar es Salaam. As long as the radio messages continued, the demand grew so much that the masons were unable to deliver to the waiting list of clients.

Lessons learnt

- The workshop only offered one latrine option at a considerably higher cost than many house owners could afford. This led to the introduction of subsidies for poor households managed by the Ministry of Water.
- Square pits were advocated at the beginning but later proved unsuitable for the majority of the low-income areas due to the sandy and unstable soil conditions. This led to a change to round pits, which proved more stable in this type of soil condition.
- The cost of a VIP latrine was not affordable by many of the targeted low-income communities. The full up-front payment system made it inflexible for house owners who could reduce the cost by digging their pits, making their own blocks and paying in instalments for other costs.
- Sanitation promotion was an afterthought, which resulted in waste of materials and latrine components. Although this was corrected later on in the project, the radio messages were developed by one person based in the office with no input from the target population. There was little opportunity for a two-way communication, as the messages were sent out through the radio.
- The workshop's closure in 1996 after the end of the GTZ and World Bank funding indicated that the approach is not sustainable. Demand for VIP latrines also reduced drastically as soon as subsidies were withdrawn and as a result, the permanently employed masons were left idle. This is also an indication that subsidizing household latrines and masons services is not sustainable.

6.2 Case study 2: Sanitation marketing in Keko Mwanga

Case study 2: Sanitation marketing in Keko Mwanga

Background

The social marketing of sanitation project was an action research funded by the Department for International Development (DFID) of the British government implemented by WEDC and WaterAid Tanzania from 2002 to 2004. The objective was to increase the demand and uptake of improved sanitation in low-income urban settlements. The research focused on understanding sanitation demands amongst the target population looking at the motivations, constraints and preferences for household latrines.

Formative research

At the onset of the project, formative research was conducted to understand the nature of demand and supply for sanitation in low-income urban areas. The outcomes from the research included motivations and barriers to installing a latrine, attributes of a latrine that are important to users, information channels for new products and difficulties encountered by masons providing latrines. The result of the formative research formed the basis for developing a sanitation marketing project which identified products (latrine options), price, place and promotion.

Training of masons

Findings from the formative research indicated that masons required further training if they were to be able to deliver the latrine being promoted. About 10 masons that were already building latrines in and around Temeke Municipality were identified through focus group discussions with house owners. The majority of these masons were resident in Keko Mwanga B and in addition 7 community mobilisation officers who were members of the sub ward Health Committee were added to masons to give support with promotion. The training began with theoretical explanation of the new latrines (advantages & disadvantages), their components, new pit dimensions and the fabrication of trapezoidal blocks. This was followed by practical training on the fabrication of the various latrines' components and the construction of a sample of each of the latrines. Modifications were made to the various latrines as necessary. A latrine catalogue showing various latrines, components and cost estimates was also provided to the masons. Moulds for trapezoidal blocks, concrete rings and sanplat, which were not found in the market were also provided. The Masons were supported to establish a centre in Keko Mwanga B where potential customers could come for information on latrine.

Demand generation

A commercial media/marketing agency was contracted to develop the promotional concepts based on the findings from the formative research. About 10 concepts were developed, which were pretested and modified to 5. These were further pretested and 3 concepts were developed into messages for billboards, fliers, posters, radio jingles and drama sketch. The campaign was

launched with a road show, with the final ceremony held in Keko Mwanga B. Potential clients were drawn to the centre following the launch. However, the radio jingles were never sent to the station due to the lack of funds and the masons/mobilisers were left to continue promotion with the aid of the catalogue.

Keko Mwanga toilet centre

The toilet centre was run by the 10 trained masons and mobilisers led by an elected chairman and supported by a secretary and treasurer. In addition to this, there were three committees, admin and finance; technical; mobilisation and education. All office holders and committee leaders were selected through an election for a three- year tenure. Job allocation for latrine construction was the responsibility of the head mason while the mobilisers were supposed to market the services and get more clients. The job of mobilisation was not very successful and to benefit from the services provided, the mobilisers insisted on working as masons, which the masons disagreed with. This led to conflicts between the masons and the mobilisers and affected productivity at the centre. Funds from the services provided were saved in a bank account managed by the leaders but the lack of book keeping brought mistrust amongst members.

Latrine technology options (products)

The latrine options that were identified include improved pit latrines (sanplat), direct pit, single and double pits, pour-flush latrines, and ecosan. Smaller pit dimensions 1m x 3m were also introduced to solve the problem of space, which was a major barrier. Pit lining with trapezoidal blocks that do not require the use of cement mortar was also introduced to try to reduce the cost of pit latrines. The masons at the Keko toilet centre indicated that the pour-flush latrine with trapezoidal block lined pits received the most enquiries, followed by the ecosan and then the sanplat. However, they have built more ecosan latrines than any of the others. It was also noted that customers preferred the large dimension pits rather than the newly introduced small pits because of their longer life cycle. The average costs of the latrines built by the masons were pour-flush (Tsh250,000 – Tsh.600,000), ecosan (Tsh350,000 - Tsh450,000) and sanplat (Tsh120,000 – Tsh250,000). The masons made further modifications to the ecosan and the pit dimensions for trapezoidal block lining. All construction materials could be purchased in the market except for the plastic squat pan.

Lessons Learnt

- The establishment of a toilet centre provided a place for house owners to go for information on latrines and to get reliable masons to build them.
- The centre converted the masons from small independent sanitation providers to a semi private sector group. As a result, it was not possible to assess how trained latrine builders can function independently post training.
- Forming and working as a group provided more work but it resulted in the cost of latrines being increased to cover the cost of running the centre. Hence small independent masons

who were not part of the group could copy their work and under price them.

- The combination of a mobilisation team and masons made sense initially but in reality it was very difficult to justify equal payments for the entire team.
- Experience from this centre shows that sanitation promotion is a key aspect of scaling up access to improved sanitation but the SIPS may not necessarily be able to implement this aspect without external support.
- Showing cost estimates of various latrines is important to give houses owners some idea but care should be taken, as prices of construction materials fluctuate thereby affecting the final installation cost of latrines.
- Training on simple book keeping is important and should be included in SIPS training even if they intend to continue working independently after training.
- The research project did not tackle other aspects of the enabling environment such as pit emptying and disposal, sanitation laws and regulations. These two aspects are necessary for ensuring the sustainable access to improved sanitation.

